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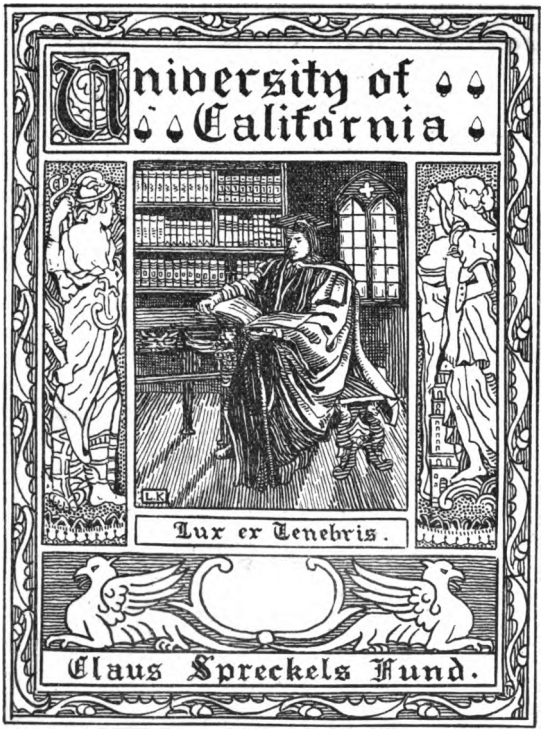
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NATURAL ECONOMY.

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NATURAL ECONOMY:

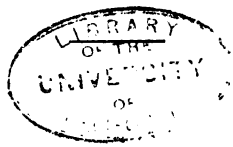
AN INTRODUCTION

TO

POLITICAL ECONOMY,

BY

ARTHUR H. GIBSON, F.C.A.



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PREFACE.

This treatise was written several years back, and was intended to form the first portion of a work on Political Economy, under the divisions indicated in the first chapter. Several chapters of the second part, dealing with Cosmopolitan Economy, were also written, but of late years the claims of an absorbing profession have prevented further progress with the work contemplated. The author has now resolved to submit this portion alone to the public judgment; his excuses are that he has no near prospect of being able to complete his task, and that in this first part he has been led to some conclusions, which differ from those of previous writers.

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CHAPTER I.

THE SCOPE AND DIVISIONS OF POLITICAL ECONOMY.

LL forms of terrestrial life require for their continued existence supplies of certain other terrestrial objects, animate or inanimate, which they devour, absorb, or utilise—in the language of Political Economy "consume." Each form or species has diverse requirements and distinct faculties wherewith to satisfy them; as we ascend in the scale of life, these requirements become more numerous and the related faculties more complex. The investigation into the working of the faculties of all species below man in furnishing the means of existence, is regarded as falling within the various branches of the naturalist's science, which has also dealt with the bodily structure of the human species; but the working of human faculties in providing for human wants has been treated as a distinct science, misnamed Political Economy. This

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division is somewhat illogical, and tends to the creation of false ideas of the position of Human Economics in relation to other sciences.

No exception can be taken to the meaning which Adam Smith attached to the term Political Economy. In the introduction to Book IV. he wrote :—"Political Economy, considered as a branch of the science of a statesman or legislator, proposes two distinct objects: First, to provide a plentiful revenue or subsistence for the people, or more properly to enable them to provide such a revenue or subsistence for themselves; and, secondly, to supply the State or Commonwealth with a revenue sufficient for the public services." The aim of his great work was to teach how those two objects could be best attained; but, with his habitual thoroughness, before drawing his conclusions he first investigated the cosmopolitan laws of production and consumption affecting the human race generally. Many subsequent writers have confined their researches mainly to those general laws which were the substratum only of his science of Political Economy; and that term is now used to include the whole science of Human Economics, of which strictly it is only a division. At the present time it is difficult to say what

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the term "Political Economy" really means. Some writers seek to define it in a way to support in advance particular theories, of which an example is found in Professor Thorold Rogers' notes to his edition of Adam Smith's work. After stating that the meaning which Adam Smith attached to the words has passed away, he says :—"It has been suggested that a better definition is found in the following : The science of those forces which set labour in motion, in so far as that labour is employed on objects which thereby acquire a value in exchange." This, it will be seen, is framed so as to exclude from the science all those unproductive personal services for which so large a portion of wealth is exchanged.

Error, as well as confusion, has resulted from this loose use of terms. Adam Smith's work was written at a time when the growth of wealth was hampered by many misconceived restrictions. The corrective necessary under those conditions was greater freedom, so as to permit the saving in production resulting from free exchange. The quantities of necessaries and luxuries producible per head were in this country, at the time he wrote, diminished to the country's detriment by political regulations.

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In the interests of this country he urged that such political regulations should be altered, so as to allow freer action to the cosmopolitan laws of production, and, at the time he wrote, the Political Economy of England, and what we may call Cosmopolitan Economy, both pointed in the same direction—the removal of restrictions on trade. But this was an accidental, not a necessary, coincidence. By the application of the term Political Economy to the whole science of Human Economics, all distinction between Cosmopolitan Economy and Political Economy appears to have been lost. Yet such distinction certainly exists. It is quite possible that what may be for the advantage of the whole human race may be detrimental to a particular State. As an extreme example may be cited the suggested abolition of the gambling attractions of Monaco, which would unquestionably benefit the race and economically ruin that little State. Many modern writers, however, have been contented with proving the truth of propositions as applied to the whole human race, and have assumed that they must therefore be true as applied to particular States.

While maintaining, in accordance with usage,

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the term Political Economy as embracing the whole science of Human Economics, in order to mark the limits of this work we wish to note certain well-defined divisions of the science. These are :—

1. Natural Economy which subdivides itself into—

   (*a*) Objective ; which, excluding human motives and human institutions, concerns itself with the operations of human faculties in satisfying human requirements. The point of view is analogous to that from which we survey the economy of bees and ants. While ignorant of the relations between individuals, and of their respective rights in the general store, we are enabled to trace out the potentialities of their faculties, their dependence on the bounty of nature, and the relations existing between production, consumption and the increase of the species. The like view is essential to a complete knowledge of Human or Political Economy, as it shows the physical limits within which the species works.

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(*b*) Subjective; which, still excluding human institutions, is concerned with the motives which induce the species to produce. We here pass beyond the limits of investigation possible in relation to ants or bees. We do not, and probably never shall, know what induces the worker-bees in a hive to work for the community, but from introspection we can trace out the various springs of action inducing production in a human community, estimate their relative strength, and trace the directions in which they co-act or counteract.

2. Cosmopolitan Economy, which introduces into the field surveyed by Natural Economy the human institutions of private property and exchange, and, excluding differences of race and language and rivalries of States, investigates the working of these institutions within the limits fixed by Natural Economy.

3. Communital Economy, which investigates what institutions tend to the advantage of a particular community. This opens

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up an exhaustless field of enquiry, for, inasmuch as the conditions of every community vary, the political institutions best suited for each will probably vary in an equal degree. Moreover communities must not be understood to mean only States. Within the same State all interests are not identical, and what is for the benefit of one part may be harmful to another. Also, two or more countries may be united by a common economic interest opposed to a third; and the economic interests of one continent may conflict with those of another.

4. Individual Economy, which marks the ultimate limit between which and Cosmopolitan Economy lie all the diverse economies indicated above. There is no science to be taught under this head, for each individual is a sealed book to be read by himself alone. The general tendency of human motives can be investigated, and falls under the subjective sub-division of Natural Economy, but the motives and acts of a particular individual cannot be forecasted.

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In this book we are concerned only with the first head of the science indicated above, viz., Natural Economy under its two sub-divisions, objective and subjective.

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CHAPTER II.

OBJECTIVE NATURAL ECONOMY.

INTRODUCTORY.

N investigating Natural Economy from the objective point of view, we must, as indicated, exclude every influence traceable to human institutions or motives. Our concern is only with the physical laws controlling production and consumption, not with any human motives inducing or human regulations organising operations within those physical laws. We have to confine ourselves to the laws of nature on the one hand, and on the other to the potentialities thereunder of human faculties in ministering to human requirements.

In order not to trangress those limits, we propose to accompany our researches under this head, with frequent references to the economy of bees. The precise standpoint we want is that of a denizen of another world unable to communicate with us, and therefore ignorant of our

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motives and institutions; but able to watch us as we watch hive-bees, and possessing knowledge of our faculties and their adaptation to our wants, such as we possess concerning bees. We know nothing of the motives which induce worker-bees to provide subsistence, not only for themselves, but for drones and for the offspring of the queen. We do not know whether any rights of property or gradations of rank exist among them, but whatever their motives or individual priorities (if any), we can trace definitely the end to which their surplus production is applied; and we can see how, in pursuing that end, they are affected by extrinsic conditions. The like knowledge of the human species is what we are concerned with in this branch of our subject.

We will recapitulate the principal facts which are known respecting the economy of hive-bees, and point out wherein it differs from that of the human race.

The requirements of hive-bees in satisfying the aims of their existence are—first, a hive or place of habitation, and thereafter, propolis, wax (to be fashioned into comb), honey, and farina. The hive under domestication is furnished by the apiarian. Among wild bees a hollow tree,

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or other place affording protection, is selected. Propolis is required to cement the interior of the hive; it is found in the requisite condition on certain trees, and the process of production consists in collecting and transporting it to the hive. Wax is the material out of which the cells, in which the honey is stored and the brood are nurtured, are constructed. By some chemistry beyond our knowledge it is elaborated by bees out of honey, and the process of production is—first, the collection and transport to the hive of the honey; and then, the manufacture thereout of the wax.

Honey, the food of the mature bee, is the staple product of the community. It is found in the nectaries of certain flowers in varying profusion, and on the leaves of certain trees in the form of honey-dew. The process of production consists in its extraction from such flowers and leaves and transportation to the hive. Farina, or pollen, is also found in the flowers visited by the bee, and is similarly produced by collection and transportation; it is the principal ingredient in the food of the young brood. In addition to the foregoing, small quantities of what has been called royal jelly are compounded by the worker-bees, for

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the nourishment of that portion of the brood destined to develop into princesses or perfect females.

The radius from the hive, within which a bee can pursue its quest for the purposes of production, is calculated by various authorities at from one to two English miles. In ordinary seasons and in fairly favourable situations, each worker-bee is enabled to produce far more than is necessary to provide for its own consumption and depreciation, *i.e.*, for the generation and growth of a worker-bee to replace it when dead. The aim of bee life, to which all surplus production is directed, is the continual increase of the species. The physiological possibilities of increase are almost without limit. According to Schirach, a single queen will lay from 70,000 to 100,000 eggs in a season, of which 95 to 96 per cent. result in abortive females, each of which, at the will of the occupiers of the hives, can apparently be developed into a perfect female. The remaining 4 or 5 per cent. are drones or males, and, if an equal number of perfect females were reared, the possible increase in geometrical progression is practically boundless. The only restriction on this power of increase is the limitation

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in the worker-bees' powers of production. Colonising, or the leading off of swarms, which is the means by which fresh centres of increase are established, takes place only when the accumulation of sufficient stores assures the continued existence of those remaining in the parent hive. The extent of the accumulations varies principally with the character of the seasons and of the surrounding flora. The untiring industry of the worker in pursuing its end appears to be ever the same. In a favourable season and with favourable surroundings, as many as three swarms will not infrequently issue from one parent hive; as many as four have been recorded, but that would seem to mark the limits of the worker-bees' powers of production under the most favourable circumstances. Under unfavourable conditions no swarming takes place. The entire labour of the hive falls to the lot of the worker-bees or abortive females, and only a short existence in idleness is granted to the males, for the purpose apparently of ensuring the impregnation of the queen. Division of employments, or division of labour as it is called, obtains among the workers. We probably do not know the full extent to which such division is carried,

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but it is known that one part of the community devotes itself to the care of the brood, while another part collects and stores the honey. Apparently some complex co-operation is necessary in the elaboration of the wax.

In the following particulars human economy, from the objective point of view, resembles that of our interesting terrestrial companions the hive-bees; both are gregarious and collect in communities; both depend on natural objects for the raw material of their productions; with both the production of some objects consists of mere transportation, while other objects are extensively manipulated and their character altogether changed by the producer; the supply of the staple requirement of both (honey for bees, cereals for mankind) depends in a great measure upon cosmical causes beyond the control of the producers; the physical powers of both are limited; in ordinary seasons both can produce more than is required for their own consumption and depreciation; in both a regular division of employments obtains in performing the necessary work of the community.

The following are important differences to be noted :—

First.—The powers of production of the

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worker-bees are limited (1) by the quantity of their individual muscular force, and (2) by the quantity of suitable objects which the hap-hazard of Nature throws in their way. This is the case also with uncivilised man, but, as civilisation advances, the limits on his powers are extended in both directions. Instead of depending upon the hap-hazard of Nature, he is enabled to control and direct Nature. His staple requirements are particular plants and animals, and, by gradations through the hunter and herdsman conditions, he has arrived at his present skill in agriculture, which enables him to direct the powers of Nature to the supply of those particular plants and animals of which he has need. Concurrently he has been able to press animate and inanimate Nature into his service, to perform those parts of production in which force is required, so that his own individual force is mainly employed in directing far mightier forces under his control. The result of this difference is that, while under similar extrinsic conditions the production of bees per worker is stationary, the production of the human race per worker is continuously progressive.

A second great difference between the economy of mankind and of bees is found in

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the application of products. With bees the excess of production, beyond what is necessary for the existence and depreciation of the worker, has only one outlet—the increase of the species: with mankind such surplus may flow in two directions—to the increase of the species, or to the improvement of the conditions of existence. Man's requirements, as well as his powers of production, are progressive; as civilisation advances his requirements become more complex and luxurious, and the surplus production is directed in part to each of the outlets indicated.

This difference, while placing the economy of bees and mankind on a different basis, tends to neutralise what would otherwise be a cardinal distinction. Among bees the possibilities of increase are sufficient to absorb any conceivable surplus of production, but it is doubtful whether the same be true of the human race. With the great increase in the powers of control over natural forces acquired in recent years, if the conditions of existence were unchangeable, and if all individuals were imbued with the consuming desire for work which distinguishes bees, it is quite possible that production would for a time have been in excess

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of human requirements. With the other outlet for excess, over-production, with a temporary exception to which we shall presently refer, is not possible among either bees or mankind. The boundless possibilities of increase of the species absorb all excess in the one case. The limited powers of increase and the limitless possibilities of improvements in the conditions of existence, similarly absorb all excess in the other case.

The terms following will be used in this book in the sense of the accompanying explanations :—

NATURAL OBJECTS in relation to any particular species are all objects (excluding the species itself) which have not been operated upon by the faculties of the species for the purpose of its economy. Thus in relation to Human Economics, in addition to all common objects, the bees themselves and the hollow trees appropriated as hives are natural objects, while in relation to Apiarian Economics the term includes the human race and all houses, implements, and other human productions.

FORCE will be used in the sense attached to it in Natural Philosophy, *i.e.*, whatever is

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capable of producing motion in a body or any change in the motion of a body.

INTELLIGENCE will be used in a special sense, partaking of both instinct and reason. We are not concerned in this work to investigate its nature, and wish only to express by it that individual mental faculty, which directs the action of the other faculties of the individuals of the species in the processes of production.

PRODUCTION is the discovery by individuals of the species of suitable natural objects, and the evolution therefrom of such things as are necessary directly or indirectly to satisfy the attainable requirements of any of the species.

PRODUCTS are the things so discovered or evolved by the processes of production.

CONSUMPTION is the using up of products by individuals of the species in satisfying directly or indirectly their attainable requirements.

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CHAPTER III.

THE ELEMENTS OF PRODUCTION. NATURAL OBJECTS.

BEFORE entering upon the consideration of the processes of production, it will be well to examine more closely the definitions adopted in the last chapter. Production does not mean creation. Science has taught us that nothing terrestrial is created or destroyed. In common with every terrestrial species, the human race, in satisfying its attainable requirements, can only utilise the inherent properties of natural objects. Reverting to our interesting fellow-creatures the bees, we find with them a faculty existent in the individuals to discover and transport the natural objects required—honey, propolis, and pollen—and a knowledge similarly existent of the inherent properties of these natural objects, which enables them to elaborate therefrom the products wax and royal jelly. They thus only utilise and direct the inherent properties of the

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natural objects, which they neither create nor impress with such properties. We may safely conclude that, unless nature provided without their aid the honey, propolis, and pollen, the hive bees could not exist, and their intelligence as a species in relation to production begins and ends with the knowledge of, and the faculty of utilising, certain inherent properties of these three natural objects. Production in relation to humanity does not differ in kind but only in degree from that of bees. Human intelligence reaches farther back, and instead of requiring like bees that, as a necessity of existence, nature shall provide unaided the staple articles ready for consumption, it is enabled to pierce through the composition of such staples, and to place the constituent parts in such relations that the staples shall be evolved. We may regard cereals to fill a similar place as a staple in human economics, to that which honey occupies in the economy of bees. But the more penetrating intelligence of humanity has discovered that cereals are compounded of certain elements found in the soil, joined to certain other elements found in the atmosphere. It has also discovered that, if a living seed of a cereal is placed in the soil under certain conditions, it

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will germinate, and evolve from the soil and air a plant bearing large quantities of seeds similar to the germinating seed. But, although the field is wider, the boundaries limiting human intelligence are as fixed and impassable as those limiting the intelligence of bees. The nitrogen, carbon, hydrogen, and oxygen entering into the cereals cannot be created, nor, in the present state of human knowledge, has any approach been made towards impressing an inorganic object with the germinating property of the seed.

Human intelligence, in relation to production, has extended only in the direction of more complete knowledge of the inherent properties of natural objects. The principal physical and biological properties have long been known and utilised. For ages the human race has known, *e.g.*, that iron is hard, that wood is soft, that iron could be used to cut and fashion wood, &c. The physical and biological properties are utilised in production in many ways. By placing natural objects with diverse properties in the necessary relation to each other, complex products, such as cereals, clothing, animal food, &c., are elaborated, or sometimes a needed simple product is evolved from complex natural

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objects, as in the extraction of metal from ores. A knowledge of the chemical properties of natural objects, after slow groping progress through many ages, has, in the nineteenth century, rushed forward with giant bounds, and, in conjunction with electric science, has so extended the field of production, as to almost revolutionise the conditions of civilised life. In no direction, however, has humanity passed over the limits imposed upon bees and all forms of terrestrial life. All its production is brought about by utilising and directing the inherent properties of natural objects.

Analysing production from the point of view of Natural Economy it is found to consist of three elements, defined in the last chapter, viz., suitable natural objects, force, and intelligence. These, and only these, elements enter into all forms of terrestrial production, except that the meaning attached in our definition to the term intelligence would have to be extended, to include the almost passive faculty of appropriation of suitable natural objects, by plant life and the lower forms of animal life. Guiding our investigations by apiarian economics, we find that a community of hive bees requires first to produce a habitation and food. In their natural

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state unaided by man, the production of a habitation consists, first, in the selection of a hollow tree or other suitable place, for which they need the natural object, the tree or other sheltered place, the force to search, and the intelligence to select. The next step, the cementing of the interior with propolis, requires similarly the natural object, propolis, the force to transport and work it, and the intelligence to find and suitably apply it. Similarly the production of the comb, the honey, and the farina can be resolved into the like elements. It is requisite to divide the labour of the bee into force and intelligence, because the two are not necessarily united, and moreover are distinct in their operations. If a worker-bee be disabled by an injury to its wings, it cannot produce, because it is deprived of one element, force, although the intelligence remains; if the injury be repaired, the wanting element is restored and production is resumed.

Tracing out in Human Economics the elements entering into the production of a house, for example, it is found to involve the previous production of all the simple materials—stone, bricks, sand, lime, timber, &c. The natural object, stone, is found in some suitable quarry,

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and force is requisite to quarry and transport it. This force may be obtained from the muscular power of men, or from some extrinsic source, as a natural fall of water, or the stored up energy in coal. But, from whatever source it be derived, the force will not produce building stone, unless intelligence select suitable beds to work, and direct the force to the natural joints or cleavage of the stone. The transport of the stone to the building site may similarly be accomplished by manual or extrinsic force, but intelligence is equally necessary in either case. The like analysis is applicable to the production of the other simple materials, to the dressing of the stones, the mixing of the sand and lime to form the mortar, &c. All these and similar processes, however, will not produce a house, but only an agglomeration of building materials. The skill or intelligence of the architect is further necessary, and this may be obtained from a man who simply traces his plans on paper, and has nothing whatever to do with the actual construction of the house. In the actual construction, the unskilled labour, such as hoisting the materials, &c., may be performed by labourers, or by extrinsic forces acting upon suitable machinery.

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All other processes of production, if similarly analysed, show that intelligence, in addition to force, is requisite to produce from a natural object. The distinction between force and intelligence in Human Economics is of prime importance, as the increase of products *per caput*, which is a principal object of human communities, is mainly brought about by the substitution of extrinsic force for the muscular force of the species.

The suitable natural objects entering into apiarian production are only four in number, viz., a sheltered habitation, propolis, honey, and pollen, and the few products of the community are limited by the quantities of these natural objects found within the workable radius from the hive. Production in relation to Human Economics is so complex, the number of natural objects utilised is so great, the powers of transport are so extensive, that we shall at this point get slight assistance from the observations of apiarians. It will be useful to consider some of the natural objects entering into the composition of a simple product such as bread. Bread is immediately resolvable into water, yeast, and flour. The latter is itself a product from wheat, which also in turn is a product

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built up, under the direction of human intelligence, partly from the constituents of the soil and partly from the constituents of the atmosphere. Yeast is similarly a product, evolved from vegetable products (barley and hops), which have also been built up from the constituents of the soil and atmosphere. In the process of baking, wood or coal is consumed, and also some portion of the iron of which the oven is constructed; the iron has been produced by extraction from ironstone. The following natural objects thus are ultimate ingredients of bread: Water, constituents of the soil, constituents of the atmosphere, wood or coal, ironstone. This is not a complete analysis of the natural objects, which, in a civilised community, enter directly and indirectly into the production, but it is sufficient for our present purpose, which is to fix certain types of natural objects. If any human product be resolved into the natural objects, as they existed before their utilisation in human production, they will be found to fall into one of the following classes:—

1. *Objects which, without human effort, are replaced immediately they are consumed.* The most widely spread of this class of natural objects are the constituents of

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the atmosphere. These enter largely into vegetable products, yet production is never limited or hampered by the want thereof, as immediately any portion is abstracted by the growing plant, it is replaced, without human interposition, at the exact spot whence it has been abstracted. Sea water and the water of great rivers are other examples of this class of natural objects, for, whatever conceivable quantities might be consumed, the supplies available for consumption at the spot of appropriation would continue undiminished. This class we will call Undiminishing Objects.

2. *Objects which, without human effort, are replaced when consumed, but not immediately.* The constituents of the soil consumed in vegetable products are examples of this class of natural objects, as are also small streams of water, and many wild forms of vegetable and animal life. If time be given, the recuperative powers of nature restore, without human aid, the equivalent of what has been taken away. The time required varies with different objects; the constituents

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of the soil are replaced after a comparatively short rest; for forest trees many years may be necessary. This class we will call Replenishing Objects.

2. *Objects which when consumed are not replaced.* Minerals are convenient examples of this class. To adopt a commercial simile, nature has ceased manufacturing this class of objects, and supplies us from her stock; when we once abstract any portion of these from her storehouse, they are never restored at the place of abstraction; if we require other supplies, they must be sought elsewhere. This class we will call Unreplenishing Objects.

All natural objects do not sort themselves so readily into one or other of these classes as the examples mentioned. Some, for example, although strictly belonging to the second class, may be so quickly, although not immediately, replaced, as to be more closely allied to the first class, in relation to Human Economics. Water from surface wells in many localities, and seaweed brought by the tide, may be cited as examples. Again, trees requiring centuries for adequate growth, although strictly belonging

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to the second class, are economically more closely allied to the third class. It is also conceivable, although we cannot recall an example, that some mineral in small demand might exist in practically inexhaustible abundance in one particular place. Such a natural object, although belonging strictly to the third class, would, in relation to Human Economics, have the characteristics of the first class. This modulation of class into class will not bar the generalisations which we shall found on this classification, any more than physiological science is barred by the difficulty of drawing the line between the vegetable and animal kingdoms. We shall see that each of the above classes affects differently the phenomena of human production. The conclusions we shall draw will be based upon the differences in the types, and the only difficulty arises in deciding to which class a small number of natural objects is, in relation to Human Economics, most closely allied.

Each and all of the natural objects entering into products are practically, in relation to Human Economics, inexhaustible. This is manifestly true of the first of the above classes. As regards the third class, only negative evidence

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is available to support the proposition, but that is sufficient. Humanity has not come to the end of the supplies of any natural object of this class, and there is nothing to indicate that such end is practically nearer now, than it has been at any time in human history. The term inexhaustible must be understood strictly in a physical sense, and, though inexhaustible quantities of all objects exist, they are not necessarily available under the conditions of Human Economy. In relation to bees, there no doubt exist inexhaustible stores of honey, but, as mentioned in the last chapter, under their economic conditions the available stores appear to be limited to a radius of two miles from the hive. Whatever the actual limit may be, it is clear that, at some degree of remoteness from the hive, the bees would consume as much honey in maintaining the faculties for their journeys to and fro, as they could transport to the hive. At that point the continued existence of a large community, which appears to be a necessity of bee life, would become impossible, and thus, though a large store of honey might be available at a distance of, say, four miles from the hive, it would be economically unattainable. Similarly in Human Economics,

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gold, to take an extreme example, is a natural object universally desired, yet obtainable in only comparatively small quantities. Nature's stores of gold are widely spread and inexhaustible, but difficult of access, and, in the conditions of human existence, there is a point of difficulty, varying at different epochs, at which gold though physically is not economically attainable: the determination of this point will be the subject of investigation in a subsequent part of this treatise. The second class of natural objects, *i.e.*, *those which are replaced when consumed but not immediately* may establish exceptions to the general rule of inexhaustibility. Certain products are obtained only by the slaughter of wild animals. The replacement of these animals depends upon the exercise of the reproductive faculties of the adult animals who escape slaughter. Such reproduction, to effectively replace the animals appropriated, must be generally on a larger scale than the slaughter for the purposes of production, as the young of all animals are subject to accidents and to destruction by the attacks of other species. When the slaughter of the adults is such that the remnant cannot reproduce on the requisite scale, the whole of the animals appropriated

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will not be replaced, and, if the slaughter be continued, the whole species may become extinct and the supplies be exhausted. Examples of a tendency in this direction are now occurring as regards sealskins and ivory. The exhaustion of the natural objects (seals and elephants) will, however, be a voluntary act on the part of humanity, and will not be allowed, if supplies of the particular natural object be keenly desired. The possible exception to the general proposition is of minor importance, and is one we can disregard in our further investigations.

Economists have been disposed to consider land a limited natural object, and likely within a short period to prove insufficient for the support of the increasing human species; as many economic problems gather round this apprehension, we will shortly consider whether it is well founded. The term land is applied in law to the surface of the earth and to what we may call the "hinterland" beneath it, extending to the centre of the earth. The ownership of the surface carries with it the ownership of such "hinterland," and also of the space above such surface, contained within lines prolonged indefinitely, drawn at right angles to the lines

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of surface boundaries. This legal conception has been generally adopted by Economists and has led to confusion. In relation to Human Economics land, as thus defined, embodies five distinct ideas, viz.:—

1. The storehouse of the natural objects, metals and minerals, utilised in production.
2. The foundation on which habitations, and other of the more permanent products, are erected.
3. The storehouse in which are contained some of the constituent parts of vegetable products.
4. The "fixed plant" whereby vegetable products are evolved from their constituent parts.
5. The "distillery" by means of which such constituent parts, when consumed, may be replaced from the atmosphere.

In the last two heads we have, in order to save cumbersome circumlocutions, used terms borrowed from commercial life. For our present purpose we may combine the heads 3, 4, and 5, and consider them as embodying the use of land in agriculture. The natural objects, metals and minerals (No. 1 above),

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stored upon and under the surface of the land, fall into the third of the classes of natural objects, and we have examined above the grounds for regarding them as physically inexhaustible. Land appropriated as the foundation of erections (No. 2 above) also falls within the third class of natural objects; the consideration of a few statistics will show its practical inexhaustibility in this character. We may safely assume the standard of existence to be as high in the United Kingdom as in other parts of the world, and considerably higher than in most. If we see what proportion of land has to be abstracted from agriculture in this country, to become foundations for habitations and other permanent products (such as factories, roads, railways, canals, etc.), we shall ascertain what is required for a community in the highest stage of civilisation whose number is known, and we can calculate what would be necessary for the whole world, not as it exists, but if raised to an equal degree of civilisation. The total acreage of the United Kingdom is about 77,000,000 or 121,310 square miles. Of this, 17,000,000 acres are not available for production, being mountain, moorland, bog, etc., leaving about 60,000,000 acres, which,

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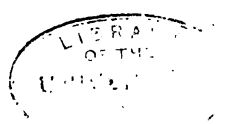
apart from appropriation for other objects, would be available for agriculture. The total acreage under cultivation is about 48,000,000 ; deducting that from the previous figure it leaves 12,000,000 acres appropriated, in other ways than agriculture, for the wants of a highly civilised community of 39,000,000. Taking the whole population of the world at 1,500,000,000 it follows that an area of about 462,000,000 acres would provide all the land required to be appropriated for non-agricultural purposes for the whole inhabitants of the world, even if raised to the degree of civilisation existing in this country ; 462,000,000 acres would represent about one-fourth of the habitable area of Europe alone.

Having regard to the vast uncultivated territories of the world and to the low point of cultivation of much that is utilised, it is certain that the land available for agricultural purposes (Nos. 3, 4, and 5 above) is not within measurable distance of exhaustion. The fears of many of the old Economists on this head have had their foundations destroyed by the discovery of modern means of transport.



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CHAPTER IV.

THE ELEMENTS OF PRODUCTION: FORCE.

IN relation to the second element of production, force, Human Economy diverges completely from that of other terrestrial species. As stated in the second chapter, with all other forms of life the only force available for production is the muscular force of the individuals of the species. (There are some possible slight exceptions to this rule, but not of sufficient importance to be noted; the utilisation of the labour of another species by slavemaking ants is a remarkable instance of a non-human species employing extraneous force). Except in so far as evolution in the course of ages developes a new species, production *per caput*, in each succeeding generation, is confined in one direction by the fixed limited force of each individual. Doubtless when the human race first appeared, production was similarly limited, and there are now existing barbarous tribes who, in this respect, have

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progressed little, if at all, from the probable original state. With civilised man, muscular force is still applied directly to acts of production, but generally in inverse proportion to the degree of civilisation, and such force is mainly employed in controlling and applying to production immensely greater forces, which his intelligence enables him to utilise. A research into the history of the employment of extraneous force, and its connection with the progress of civilisation, would afford matter of much interest, but it would be outside the purpose of this work, and we shall therefore only seek to classify the forces, which, in the existing state of civilisation, are employed in production. These fall into three classes, viz. :—

1. The muscular force of the species, to which we have just referred, and which we will distinguish as "Human Force."
2. Immense forces are available for production by the operation of cosmical causes. Examples of this class are the wind, waterfalls, running streams, and tides. In all these cases the force is actively at work, and, if not utilised, simply runs to waste. The force resident in the rays of the sun also falls into this class, and,

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when we attain to a more complete knowledge, we shall doubtless find electric force generated cosmically available for production. The characteristic of this class of force is its existence in active operation without human effort, and we will distinguish it as "Cosmic Force."

3. In the surrounding natural objects immense forces lie latent, which human intelligence is able to make active. The greater portion of the forces hitherto used in production falls under this class. It includes the muscular force of draught animals, the force generated from coal, the electric force generated by the action of acids upon metals, etc. Its characteristic is that it is a product (see definition), and as such resolvable into the same elements—Natural Objects, Force, and Intelligence—as any other product. We will distinguish this class as "Produced Force." The natural objects entering into its production may be of any or all the three classes, noted in the last chapter. Wood and coal, for example, are storehouses of force brought

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into operation by their combustion. Wood, if grown for the purpose, is a product, into the composition of which undiminishing objects (some of the constituents of the air) and replenishing objects (some of the constituents of the soil) enter; if obtained from clearances of primeval forests, it partakes of the character of an unreplenishing object. Coal is an unreplenishing object. The force entering into the composition of a produced force may also be any one or more of the three kinds we have indicated. From a physiological point of view, it is possible to connect the muscular force of the species with the food consumed, and in this sense to consider that also a produced force. We mention this to disregard it, as it leads only to a profitless circle of reasoning. In the same way, the muscular powers of bees might be traced back to the honey consumed by themselves and their progenitors. The chain of acts involved in the economy of a species is complete, when a product is consumed in directly satisfying any individual requirement.

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If the individual puts forth the force sustained by such consumption for fresh acts of production, that is the commencement of another chain.

Occasionally acts of production are necessary to utilise and maintain a cosmic force. Examples of this combination are seen in the construction and continuous repair of a mill dam, and in the banking up of tidal waters, to utilise their gravitating force when the tide has receded. With such exceptions, of which there are not many now, but which probably will be more numerous in the future, the three types of force noted in this section are well marked in all acts of production.

The different forces entering into Human Economics vary greatly as regards their mobility. In production it is necessary to apply the force to the natural object, and, to that end, either the force must be moved to the natural object, or the natural object to the force, or perhaps each may be moved towards the other. Human force is mobile, but not universally so. Apart from economical limitations mentioned below, conditions of climate and of accessibility may prevent the transportation of human force to the site, where, if available, it could be

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usefully applied. Cosmic forces are for the most part immobile, and can only be utilised at or near the spot where they exist. Produced forces are generally the most mobile; in fact, their mobility is the chief property which prompts their production. Draught animals have for many centuries been produced, because their force can be readily transported, but the most mobile force hitherto extensively used in production is that generated from coal. In this mineral intensely concentrated force lies in a small compass in a latent state, and these conditions enable the force to be readily transported without leakage. Doubtless other repositories can be produced, such as liquified air and oxygen, which contain greater forces in smaller bulk and weight than coal, but, up to the present, the application of these to production has been barred by economical limitations. Probably the most important factor of future progress in Human Economy will be the mobilising of cosmic forces. In a physical sense all such forces are mobile now, by conversion first into electric force, which, by means of conductors and secondary batteries, can be transported anywhere, but the practical employment of these methods is also barred by economical limitations.

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The cosmic forces, which are running to waste unutilised over the earth, are practically inexhaustible. The winds, tides, rivers and waterfalls in the various parts of the earth together represent an aggregate of force in continuous active operation, compared with which the forces of all kinds actually utilised in production are an insignificant fraction. The immense forces in operation in the flow of any considerable river, continuously repeated in every few yards of its course; the power dispersed in the ebb and flow of the tide, in a comparatively small river like the Thames; the concentrated energy running to waste at the Falls of Niagara, and repeated in the rapids below the falls; the great forces of the winds—reflection on these phenomena will convince the reader, that the cosmic forces, in relation to human production, are as inexhaustible as the atmosphere or the waters of the ocean.

Similarly, produced force is also inexhaustible, being evolved from natural objects, the inexhaustibility of which we have indicated in the last chapter; but this form of force is also subject to the economical limitations as regards its mobility, which we will now consider.

The economical limitations on the theoretical

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mobility of all forces, for the purpose of production in Human Economics, are similar to those which are imposed on bees, by the conditions of their existence, in regard to honey collection. To render such forces economically mobile there must, in commercial parlance, be "a profit on the transaction," and, to that end, the quantity of force transported to the productive *locus in quo* must be greater than that of the forces expended in its transport. To illustrate this, let us suppose production proceeding by the aid of native human force in a torrid district, with a climate unhealthy and enervating for Europeans. Let us further suppose that native human force cannot be obtained in sufficient quantities, and that it is proposed to transport thither human force of European origin. The Europeans not being acclimatised, it might be necessary to utilise the native human force to transport them to the site of production, and subsequently to transport for their sustenance the various requirements of civilised races, which the natives do not need. Arrived at the site, the Europeans might, in consequence of the climate, be unable to put forth more than a fraction of their muscular force. Under such circumstances it

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is conceivable, that more force would be expended in the transport of the Europeans and of their necessaries, than would be obtainable from them on the productive site, and that the native human forces would be more economically employed directly upon production, than indirectly in transporting the European human force and necessaries; so that, under the supposed circumstances, such force, although theoretically, would not be practically mobile in relation to Human Economics. (It must be remembered that the hypothesis only deals with transport for the purpose of force; the transport to the site of production of Europeans, for the purpose of supervision, is connected with the remaining element of production, intelligence, which we shall consider in the next chapter). Similar limitations contract the mobility of cosmic and produced forces. As stated above, a cosmic force, such as a waterfall, may be utilised to generate electricity, and so to charge secondary batteries, for transport to a productive site. In these circumstances, force would be expended in constructing and maintaining the electric plant, and in conveying the secondary batteries to and from the productive site. At a certain distance the force so

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consumed in conversion and transport would exceed the force transported, and, at that point, the force of the waterfall would cease to be economically mobile. For like reasons the produced force, coal, loses its mobility at a determinable distance from its place of extraction.

Wherever the force expended on transport is greater than the force transported, such transportable force becomes economically immobile, but the converse is not necessarily true, viz., that, where such force expended in transport is less, the transportable force is economically mobile. The third element of production, "intelligence," also enters into the problem, and its consumption may render the transport unprofitable.

Apart from the utilisation of additional force, savings are continuously effected in the consumption of forces usually applied to production. This has been accomplished, as regards coal, by the adoption of improved methods in the generation of steam, and particularly by the more direct application of its latent forces in driving gas engines. A like saving follows, in relation to human force, by the application of the force of each individual to one special and repeated act of production. This does not

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include the whole gain resulting from what is known as division of labour, which effects principally economies in the consumption of intelligence, and in that respect will be considered in the next chapter. The purely muscular part of the human frame possesses a power of adaptation to the work to which it is applied. Every distinct action utilises certain special muscles, and, when such muscles are continuously in active operation, they become abnormally developed. So far as the higher productive power of the expert craftsman, over the unskilled labourer undertaking similar work, is due to the quickness and ease of his muscular acts, it is a saving effected in the application of force to production. By division of labour, a further prevention of waste of human force results from the saving of time, otherwise lost in passing from one employment to another. A like result is traceable in relation to bees, of whom some devote themselves to the care of the brood, while others are engaged in the quest for honey, with obvious economical advantages. We do not know sufficient of bees to judge whether, by division of labour, they also acquire special muscular dexterity.

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CHAPTER V.

THE ELEMENTS OF PRODUCTION: INTELLIGENCE.

THE third element of production, intelligence, we have defined as that individual mental faculty, which directs the action of the other faculties of the individuals of a species, in the processes of production. The entire mentality of most forms of animal life does not apparently embrace more than this, but the human species possesses another mental faculty, which greatly affects production, but is not an element. This is the faculty of invention, by which mankind are continually adding to their individual powers of production; it is quite distinct from the intelligence they possess, akin to that of bees, which is a necessary element in all production. It is conceivable that mankind might be deprived of this faculty of invention, yet their intelligence would enable them to utilise, in future production, all existing aids attributable to its past

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exercise. For want of a single term sufficiently definite, we shall use the words "inventive faculty" to denote it, and shall continue to employ the word "intelligence" to distinguish the element of production, in the terms of our definition.

The individuals of every terrestrial species and variety appear to possess the intelligence necessary for the production of what is required for their sustenance, including, as we have previously said, in the term intelligence, the apparently passive powers of absorption, possessed by plants and the lower forms of animal life. By closely watching the habits and requirements of other forms of life, the human race has acquired sufficient knowledge to produce for them, but otherwise, with slight unimportant exceptions, the general rule may be stated, that the intelligence necessary to produce for any species exists only in the individuals of that species. Confining our attention to Human Economics, we may predicate, that the intelligence necessary for production exists only in the individuals of the human race. The mental faculties of certain animals, such as horses, elephants and dogs, are employed, to a small extent, in aid of human intelligence

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in production; a well-trained sheep dog, for example, will enable one man to drive sheep as effectively as three men, without the aid of a dog. But the dog only economises the intelligence; he does not replace it. The places to which the sheep must be driven, for the purposes of production, are determined by human intelligence alone, and, under direction of its master, the dog accomplishes work, which otherwise would call for a further consumption of intelligence; but the dog's mental faculties alone, unless so directed will not result in production. The total sum of such aids to intelligence is moreover, in relation to the mass of production, a negligible quantity.

It is important to keep in view the fact that the element intelligence is found only in the individuals of the species, as it follows that intelligence is the only limited element in production. Natural objects, we have seen, are unlimited; though human force is limited, the forces which can take its place are unlimited; but no substitute can be found for human intelligence.

When production is accomplished by directing cosmic and produced forces, it would appear that

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a higher degree of intelligence is generally required, than is called for in the direction of human force. This is not deducible from the nature of cosmic and produced forces, but is a fact noticeable in the history of the use of those forces in production. There are some instances of the application of cosmic force in simple forms, as in the utilisation of the drying properties of the wind and sun, which require no higher intelligence than the simplest human action. But the methods by which these forces have usually been utilised in production, are such as to require a higher intelligence.

Such utilisation has been brought about mainly by means of complicated machinery, constructed to work as automatically as possible. In order to understand the nature of the higher intelligence, required in directing cosmic and produced forces, we must examine here shortly the relations of the inventive faculty to production. All species below man appear to be limited, in their relations with the outer world, by their common inherited powers, and, within human memory, none of them has passed beyond its original limits. The doctrine of evolution, however, teaches us the necessity of

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the qualification "within human memory." The complex organisation of many existing species is known to be due to inherited variations, of a nature to benefit the individual. Such variations endow the individual and its descendants with fresh powers; fresh beneficial variations accumulate on the original variety, conferring additional powers, until, ultimately, the resemblance between descendants of the same parent species becomes as remote, as that between a bird and a reptile.

The inventive faculty does for man in a few years, what natural selection accomplishes for other species only after countless ages. The acquisition of the power of rapid transport by birds has been the result of inherited variations, extending over accumulated epochs; a like and almost co-extensive power has been conferred, by the inventive faculty, on man, in a comparatively infinitesimal period. The power of traversing oceans possessed by whales, must have been of growth, as slow as that of the birds' power of flight, but a like, and fully as extensive, power is now possessed by man. With his present discovered powers man is, in relation to the outer world, as distinct from primeval man, as an existing highly organised

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species from its lowly progenitors. Every new invention extending his powers makes him, in his relations with the outer world, a fresh variety, and the accumulation of these over centuries almost entitles him to rank as a new species. As his powers have increased, his wants, and the methods of supplying them, have become more complex; just as the requirements and processes of a highly organised species are more complex than those of simpler forms. The intelligence of each species, whether high or low, is sufficient for itself, and similarly the intelligence of primeval man and of existing barbarous races must be regarded as sufficient for their requirements; but, in the same sense in which we should regard the intelligence of the feline genus as superior to that of the molluscs, so we must look upon the intelligence of civilised man, directing the complicated processes of his production, as superior to the intelligence of the cave-men, who directed only their own muscular forces.

The difference is, however, not very great; it must be remembered we are speaking only of the element of production, intelligence, according to our definition, excluding the inventive faculty. The daily work of our agricultural

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labourers does not require intelligence greatly above that of savage races. The connection between our agricultural labourers and the more complicated processes of manufactures is established by the large numbers of peasantry, who are annually drafted to our large towns, and become artisans. Superior intelligence is doubtless required by the latter in exercising their vocations, but it is probable that the higher intelligence necessary could be acquired by most existing races.

Whether or not the capacity for its acquisition be inherited, this higher intelligence, required for the direction of cosmic and produced forces, utilised in the present stage of civilisation, cannot be put forth until after a process of education. The intensity and duration of such education varies with the different departments of production. The degree of intelligence required for the direction of some extra-human forces may be acquired in a few months; in others, such as the higher branches of engineering, the necessary education is the work of years. To acquire this higher intelligence thus requires the consumption of intelligence, and, as it is the one limited element of production,

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the education of such higher intelligence reduces the immediate production, with the view of ultimately increasing it. The consumption is generally two-fold: the intelligence of the instructor, and the intelligence of the pupil. In some departments, the pupil is educated by watching and aiding the instructor, when engaged in actual production, and, in such cases, the intelligence of the instructor is not withdrawn from production, and is not, therefore, consumed in educating the pupil. But, in the higher arts, it is found to be economical that professors should withdraw partially or entirely from production, in order to apply themselves to the work of education; and this involves a consumption of intelligence, which would otherwise be available for production. Further, the experience of civilised nations has led to the belief, that production is advanced ultimately by instructing the younger population in the elements of general knowledge, whereby they become better fitted for the reception and utilisation of the special knowledge, required to educe the higher intelligence needed in the direction of non-human forces. To this end, a section of the community is withheld from direct acts of production, and its intelligence is wholly consumed

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in imparting such general knowledge. The intelligence of the pupil is consumed similarly, by withholding him wholly or partly, during the educational period, from direct acts of production. The intelligence of the young of the human species is at an early age sufficient to direct simple acts of production, but, as indicated above, it is deemed advantageous to abstain from so applying it, and to consume it instead upon itself, in increasing its ultimate utility. We may note here that, concurrently with this consumption of intelligence in educing the higher intelligence, there is a consumption or waste of the human force of the individuals engaged thereon, but the aggregate of the human force so consumed is infinitesimal, in relation to the forces applied to production, and may be disregarded.

Intelligence, in proportion to the number of the species, cannot be quantitatively increased, and any saving which can be effected in its consumption is, therefore, of first importance, in relation to human production. The effect of such saving is practically the same as a quantitative increase. One individual cannot be endowed with a two-fold intelligence, but, if the forces directed by him in production can be

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doubled, the economical result is the same as if his intelligence had been duplicated. The means by which intelligence is saved in production are principally the three, which have already been indicated, viz. :—

1. By training certain domesticated animals, who, in some of the simpler processes of production, afford efficient aids to intelligence. Dogs and elephants rank foremost among the species thus utilised. Dogs, as aids to the farmer, the drover, the sportsman, and as guardians of property, perform work, which would otherwise call for the consumption of human intelligence. Elephants, also, in stacking timber logs and in similar work, bring to bear faculties, whereby much human intelligence is saved, which would otherwise be required in directing force. Horses, and other draught animals, economise human intelligence, but to a much smaller extent; they are principally utilised as mobile forces only.
2. By the employment of automatic machinery. The development of the mechanical arts has enabled the human race to copy by machinery nearly every

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movement of which the human hand is capable, and, wherever a continued act of production involves a sequence of movements, whether similar or differing, the mechanician is generally able to make his machine exactly copy such movements, and take them up in regular order. The development of the automatic principle in machinery has been slowly progressive. All machines by which non-human force is applied are more or less automatic, but the early simpler forms bear slight likeness to the methods, whereby intelligence is now economised. The modern weaving loom aptly illustrates the extent, to which the automatic principle can be applied. An ordinary pattern on a Jacquard woollen loom would include a large number of threads in the warp, arranged in series of colours, each of a varying number of threads; and a number of threads of various colours for the weft. In order to develop the pattern correctly, exactly the right threads must be separated in regular succession in the warp, and, while so separated, the correct colour of weft

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thread must be thrown between the separated threads: immediately thereafter the weft thread must be beaten against the preceding thread; the woven cloth must wind itself on, and the unwoven warp unwind itself from, a beam, both movements being at accurately prescribed though differing rates. Each weft shuttle must be thrown at such a speed that it will unwind without breaking the thread, and will slide without concussion into its box, after it has crossed the warp. It is difficult to estimate the quantity of intelligence necessary for such a piece of work, apart from machinery. To lift each time exactly the right threads of warp; to select the shuttle holding the right shade of weft; to throw the shuttle with the exact velocity required; to beat up the weft thread each time with an unvarying prescribed force; to let off the exact quantity of unwoven warp, and to take up the exact quantity of woven cloth; to accomplish these movements would require the co-operation of many units of intelligence, who might succeed with

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practice in throwing four or five shots or weft threads per minute. A modern loom enables the work to be carried on perfectly by one weaver, at the rate of upwards of one hundred shots per minute.

3. By the appropriation of individuals to special and repeated acts of production. The resulting saving of intelligence is the main advantage derived from division of labour, which is a favourite theme of political economists, and has been amply illustrated by many writers. The saving appears to be effected in three principal ways :—

(a) Intelligence, like human force, appears to possess an inherent power of adapting itself to the performance of acts continuously repeated. Apparently acts, which when first undertaken require the concentrated intelligence of the performer, are, after frequent repetition, controlled mainly by some inferior portion of the mentality, and are only supervised by the higher portion, which is almost free to concern itself with other

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matters. These lower faculties work with less hesitancy, and consequently with greater speed, so that, when an act of production has been repeated sufficiently to allow its control to be thus relegated, successive acts are completed in shorter time, and the produce per unit of intelligence is increased. Such appears to be a partial explanation of the dexterity, acquired by practice, but the truth of the fact is independent of the correctness of the explanation, and is daily proved in our manufactories.

(b) The higher intelligence, required for directing cosmic and produced forces, has become so specialised, that, in many instances, an individual can be efficiently educated only for one department or division. The inefficiency of the jack of all trades has become a proverb. The superior productive power of a master of some art, over the man with some general but less complete knowledge, is a saving (or increased efficiency) of intelligence, resulting from division of labour.

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(c) The principal saving is effected in respect of the loss of time, which otherwise must take place, by continually changing from one employment to another. The intelligence available for production is limited by the duration of the working capacity of individuals, each of whom has only so many "years of work" in him. If his intelligence be wasted or be not utilised for production at the moment in which it is available, so much of it is for ever lost.

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CHAPTER VI.

THE ELEMENTS OF PRODUCTION IN OPERATION.

T is evident that human powers of production are limited, as otherwise all the requirements of every individual would be satisfied, which we know is not the fact. The investigation of the elements of production in operation thus branches out into two nearly distinct enquiries, viz.: What are the limits on the productive powers of humanity? and, To what particular products will those limited powers be applied?

Examining a hive of bees we may note three possible economic conditions, viz.:—

1. In which the production is insufficient to maintain the hive, and the numbers decrease.
2. In which the production is just sufficient to maintain the hive, and the numbers remain stationary.
3. In which the production is more than sufficient to maintain the hive, and the numbers increase.

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The second condition marks a state of productive equilibrium, and implies that the producers must, during their short lives, produce sufficient to maintain themselves while working, and also to maintain the queen and sufficient drones to ensure the growth of a brood, equal in number to the population of the hive. In commercial language, they must produce enough to maintain themselves, and provide for their own depreciation. If production fall below this, the first condition will ensue; if it rise above, the third condition results, and the whole surplus production is directed to the increase of the species. These three conditions obtain in relation to human communities, but, if the third condition exist, *i.e.*, if the production be more than sufficient to maintain the community (including in maintenance, making good depreciation), three possible variations may ensue, viz. :—

1. The standard of existence may remain the same, and the surplus products be wholly applied, as with bees, to the increase of the species.
2. The number of the community may remain constant, and the surplus products be wholly applied to improving the standard of existence.

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3. The surplus products may be applied concurrently, partly to increase the community, and partly to improve the standard of existence.

With bees and humanity it is obvious, that the final objects of the hive and the community can only be attained, when the third condition above noted exists, viz., when the production is more than sufficient to maintain the hive or community. What quantity is sufficient for such maintenance must vary with the number of the hive or community. It follows, therefore, that, though the total production of a hive or community might be increased by an increase of population, the result might be the reduction or annihilation of the excess available for its ultimate objects. The number of bee-hives in a district might be increased to such an extent, that the quest for honey became much more laborious; the gross quantity of honey collected might, and probably would, be greater than with a smaller number of hives, but the surplus stored would be less relatively to the number of workers, and might be absolutely less, or even nil, *i.e.*, the whole of the production might be required for the immediate sustenance of the workers. In that case the ultimate

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object of bee existence—the multiplication of the species—could not be attained, and the economical condition of the larger number, though with greater production, would be disastrous. Similarly in a human community, an increase of production, consequent on an increased number of workers, might result in reducing or absorbing the surplus available for the increase of the species and the improvement in the conditions of existence, and the community, as the direct consequence of its increased production, might approach or actually descend to the second economical condition mentioned above.

It will be convenient here to define the meaning we affix to some terms, which will be frequently used in this and subsequent chapters.

Gross products are the total results of acts of production.

Net or surplus products are gross products, minus what is necessary for the existence and depreciation of the producers.

Surplus ratio is the proportion which net products bear in any hive or community to gross products.

In satisfying the wants of human communi-

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ties, some products are evolved in large quantities; of others only comparatively small quantities are needed. We shall employ the phrase

Scale of production to mean as applied to commodities the extent of their production.

Where the scale of production of any product is large, the production may be carried on by each individual producing for himself, or by a section of the community producing that particular product for the whole community, or partly in the former way and partly by a section producing for the sections other than the individual producers. This concentration of production, which is the means by which the advantages of division of labour are secured, we shall call *intensity of production.* A high degree of intensity is possible only with such products as are produced on a large scale, but production on a large scale may exist with only a low degree of intensity.

In analysing the phenomena of production, it is necessary to remember that its methods are so complex, that the definite effect of any cause can rarely be traced. Many causes are in co-temporaneous operation, some in direct or

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partial co-operation, others in direct or partial opposition. Ascertained effects are known to be the resultants of these several causes, but it is generally impossible to determine, to what extent any cause has contributed to or modified any effect. Probably no single cause in Human Economics is ever allowed its full natural effect, and the result of its free operation can only be estimated theoretically. We shall therefore speak of causes as *tending* to certain results, and the theoretical effects we shall call *tendencies*. It will be necessary at first to exclude from consideration the operations of the inventive faculty; most of the following propositions are predicable only of a hypothetical condition, in which the inventive faculty, having carried us up to a certain degree of civilisation, has ceased to operate.

It will be obvious, from what is stated above, that the happiest economical condition obtains when the potential surplus ratio is greatest, not necessarily in a human community that all the possible surplus products may be evolved, as the alternative object of improving the conditions of existence may take the direction of rest from, or partial cessation of, production; but the ultimate objects of human existence can only

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be gratified, in a degree directly dependent on the greater or less potential surplus ratio. We shall, therefore, endeavour to ascertain what causes increase and what causes decrease the surplus ratio.

The human race, in common with all forms of animal life, naturally seeks to satisfy its wants with a minimum of personal exertion. Bees do not discard suitable honey stores adjacent to their hives, to seek similar distant stores; horses and other grazing animals appropriate such suitable objects of the same kind as are nearest to them, and similarly man, when seeking any natural object, appropriates such of the kind he requires, as is most easily obtained.

Undiminishing objects are not affected by this fact, as an unlimited quantity of the particular object is of equal accessibility.

Unreplenishing objects will obviously be appropriated in the order of their relative accessibility. With animals below man, the degree of accessibility is inversely proportionate to the amount of force required, inasmuch as only the muscular force of the species is available, and force therefore measures individual exertion. With man, however, one store of an

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unreplenishing object, requiring a large amount of force, may be more accessible than another calling for a much smaller amount. Of two coal properties, for example A and B, at A may be required more force to extract and convey the coal than at B, but plentiful stores of cosmic force may be available at A and not at B; in that case the coal at A, though requiring more force, would be more accessible than the coal at B, and would be first produced. Appropriation in the order of relative accessibility must, however, be understood to be subject to reasoning foresight; when a coal-pit is sunk, for example, the coal will be worked so as to minimise the quantum of intelligence necessary for the extraction of the whole area of coal intended to be raised by means of the new pit, and much of the most accessible coal, near the bottom of the pit, will be worked last instead of first, as its extraction, before that in the rest of the area, would immensely increase the expenditure of force and intelligence necessary to obtain the more distant coal.

Replenishing objects will also be first appropriated at the most accessible site. So long as the quantities required do not exceed the

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quantities replaced at such site by the recuperative powers of nature, these objects, in relation to production, are practically undiminishing objects. When the most accessible site can no longer supply continuously what is required, recourse must be had to less favourable sites, and, as the recuperative powers of nature are overtaken at each site in succession, this class partakes of the character of unreplenishing objects, with the possibility, as with wild animals, of complete exhaustion of the supply.

Since intelligence and force are both necessary to all production, and, while force is practically inexhaustible, intelligence is a limited element, it follows that the greater or less quantity of products per unit of intelligence (*i.e.*, per producer) must depend *inter alia* upon the greater or less amount of force, which each unit of intelligence can direct; in other words, the surplus ratio will tend to increase with any accretion to, and decrease with any diminution in, the quantity of force, which each unit of intelligence can direct. In the last chapter we noted three methods by which intelligence in relation to force could be economised, viz.: (1) by training certain domesticated animals; (2) by the employment of automatic machinery;

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and (3) by the appropriation of individuals to special and repeated acts of production; but none of these methods can be effectively adopted, while an individual is producing only for himself. They are practically only available when there is intensity of production, and the extent, to which they can be adopted, appears to continually increase with the raising of the degree of intensity. The first of the intelligence-saving methods above noted—the training of domesticated animals—does not enter largely into production, but this is most extensively adopted, when the degree of intensity is high; the limited mentalities of such animals cannot be trained to undertake a large number of differing duties, but, with a high degree of intensity, each animal can be utilised continuously in one or two duties, within the scope of its mental powers. The other two methods of economising intelligence—the employment of automatic machinery, and division of labour—are increasingly operative, as the degree of intensity of production rises. In relation to automatic machinery this is obvious to anyone, who has the opportunity of comparing the manufacturing processes of the same industry, conducted respectively on a large and

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small scale. The small master, as he is called, does many things by hand which, in a large factory, are done by machinery, for, if he incurred the expense of the automatic machine, he would not have sufficient work to keep it occupied. The machine itself represents a large amount of intelligence consumed in its construction; if that original expenditure of intelligence be spread over a large production, by the constant utilisation of the machine, there results a saving of the total intelligence consumed in the machine and its products; but, if the machine be not kept continually producing, the intelligence represented in its construction has to be divided over a smaller quantity of products, and may make the total consumption more, than if the machine be dispensed with. There appears to be no limit to the power of economising intelligence, by the use of automatic machinery, as the degree of intensity of production rises. The two do not necessarily advance *pari passu*, but it may safely be affirmed, that the evolution of no product has yet reached the degree of intensity, at which a further raising would not render economically possible the further substitution of machines for intelligence.

To a much greater extent a raising of the

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degree of intensity of production economises intelligence, by the appropriation of individuals to special and repeated acts of production. Every rise in the degree of intensity makes fresh divisions of labour possible; these result in further economies of intelligence, as indicated in the last chapter. It may be pointed out, that this is what tends to give stability to manufacturing trades already established in particular countries, towns, or districts; if an attempt be made to start such a trade in a new district, the different branches of production cannot be sub-divided so completely, as is possible where the trade is carried on more intensively, and thus, unless there are other advantages in the new district which compensate this disadvantage, such attempt is likely to fail. In respect of division of labour, as in respect of automatic machinery, it may be safely affirmed that the evolution of no product has yet reached a degree of intensity, at which a further rise would not render possible further economies in intelligence.

As stated in Chapter IV., division of labour also effects a saving of human force, and in that respect also, although only to a small extent, the surplus ratio tends to increase with a rise in the degree of intensity of production.

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Such being the theoretical relations of force and intelligence in operation, we will next consider them in combination with each of the classes of natural objects. Natural objects are brought into relationship with force and intelligence in two ways—(1) as the basis or adjunct of the ultimate products directly consumed by the human species, and (2) as a constituent of produced force; whichever of these purposes they may serve, the tendencies which we shall proceed to define are equally operative.

Undiminishing objects do not tend to fetter or counteract the theoretical relations of force and intelligence, and, with this class, the variation in the degree of intensity of production has free scope to increase or decrease the surplus ratio.

Unreplenishing objects, we have seen, are appropriated in the order of their relative accessibility, whence it follows that, at each site where any particular object of this class is produced, there will be (subject to what was stated on page 69 as to reasoning foresight) a tendency to a continued increase in the quantity of force required to obtain a given quantity of product; or, in other words, the quantity of product per unit of force will tend to decrease. As each

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favourable site of production is in turn exhausted and abandoned, recourse must be had to less favourable sites, where, either the force required per unit of production is more, or where the facilities for using non-human force are less. In either case the quantity of product per unit of intelligence must from these causes tend to decrease. If the degree of intensity remain constant, there will be a continuously decreasing surplus ratio; if the degree of intensity rise, there will be a struggle between the tendency of the surplus ratio to increase, resulting from the relations of force and intelligence, and the tendency to decrease, resulting from the continuously decreasing accessibility of the natural object. The result of the struggle would be different probably with each particular natural object; with those unreplenishing objects which approximate to undiminishing objects (see page 28), the retarding tendency of decreasing accessibility might be almost nil; with other objects, such as the rarer metals, the increase in the scale of production might, notwithstanding increased intensity, speedily bring about a decrease in the surplus ratio. If the degree of intensity in this class of natural objects decrease, there must result a decrease in

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the surplus ratio of the products into which they enter, as the control of intelligence over force would decrease, concurrently with decreasing accessibility of the natural object.

So far, therefore, as this class of natural objects enters into production, it has a tendency, varying in strength with each particular natural object, to counteract the increase in the surplus ratio, attributable to a rise in the degree of intensity of production: theoretically each object would tend towards the highest surplus ratio, at that degree of intensity, where the loss per unit of force due to decreasing accessibility, first equals the gain per unit of force resulting from the saving of intelligence.

Replenishing objects, while the scale of production does not call for more than the unaided recuperative powers of nature supply at the most accessible sites, partake of the characteristics of undiminishing objects, and, within that limit, allow free scope to the increase or decrease of surplus ratio, coincident with variations in the degree of intensity of production. With some nominally replenishing objects, such as tidal waters, the limit is never passed; with others, of which herrings and codfish are examples, the supplies, on the existing sites of

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production, appear to be practically undiminishing, in relation to any probable increase in the scale of production. With many replenishing objects, when the unaided recuperative powers of nature, at the most accessible site, fall short of what is required to maintain the scale of production, there obtains, at that particular site, a rapid decrease in the degree of accessibility: the quantum of reproductive power is invaded, and, if the scale of production be maintained or increased, the supplies due to the unaided recuperative powers of nature will continually diminish, and ultimately be exhausted. Before that point is reached, recourse is usually had to less favourable sites, which are utilised when their degree of accessibility, originally less, has become equal to the continually decreasing accessibility at the more favourable sites. Some replenishing objects, however, among which we may note the dodo and the buffalo, have been exhausted; others, such as seals and elephants previously referred to, have attained a scale of production, which has overtaken the recuperative powers of nature, not only at the more favourable sites, but at every known site.

The most important of replenishing objects in Human Economics are those constituent parts

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of vegetable produce, which are found in land (see page 33). These are required in the evolution of crops of corn, roots, grasses, and green vegetables. As regards their replenishing power, it appears that it cannot altogether be exhausted, and in this important respect they differ from seals, elephants, and other forms of animal life. The experiments at Rothamstead demonstrate that, without manures, a similar crop may be grown continuously on the same plot: the produce per acre is very small, compared with fertilised plots, but there appears to be an average quantity (varying with good and bad years), which the unaided recuperative powers of nature will provide, although no rest be given to the land, other than the inevitable rest between seasons.

The appropriation of the constituents of the soil in agriculture also illustrates the working out of a problem, arising in connection both with replenishing and unreplenishing objects, that of relative accessibility. These constituents are found intermixed with stones, and also appropriated naturally in the growth of weeds. With rough tillage, some portion of the constituents are utilised in the production of the required crops, but only a fraction of what might be

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similarly available, if all weeds were eradicated and all obstructive matter removed. When the products resulting from such rough tillage prove insufficient for the wants of the community, the problem arises, whether the deficiency shall be made up by similar tillage of more distant lands, or by more thorough tillage of the lands already roughly cultivated. Let us suppose that the rough tillage represents x units of intelligence, expended, directly or indirectly, in evolving b products from F plot of land; it is required to increase this production to, let us say, $2b$. On the distant lands (G plot) x units of intelligence will provide the necessary additional b products *in situ*, but it will require y units of intelligence to transport the products to the place of consumption, *i.e.*, at or near A. Now let us suppose z_1, z_2, z_3, etc., to represent units of intelligence which can be expended in successive degrees of higher intensity of tillage of plot F, and that $x + z_2$ units of intelligence would evolve at F the entire $2b$ of products required. Under these circumstances will the additional b products be evolved at plot F or plot G? Or, in other words, are the required constituents of the soil, obstructed by stones and intermixed with weeds, at F more or less accessible, than the

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free constituents of the soil at G? The answer depends on whether z_2 is greater or less than $x + y$; if less than $x + y$, the additional products will be evolved at F; if greater than $x + y$, while z_1 is less than $x + y$, part of the additional products will be evolved at F and part at G, *i.e.*, F will be cultivated to the degree of $x + z_{1+a}$, where z_{1+a} is less than z_2 but equal to $x + y$, and the balance necessary to make up the additional b products required will be evolved at G. As the community further increases, plot G will be fully cultivated up to the x degree of intensity; then, if the requirement still increase, recourse will be had to the site (H), next in order of accessibility, requiring v units of intelligence to transport the products to F. Let us suppose that $v = z_3$; then this will regulate the degree of intensity applied to plots F and G, thus :—

F will be cultivated to the $x + z_3$ degree of intensity.

G will be cultivated to the $x + (z_3 - y)$ degree of intensity.

H will be cultivated to x degree of intensity.

When the problems of relative accessibility are worked out under actual mundane conditions, they present complications more intricate

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than those indicated in the foregoing hypothesis. Thus we have assumed that the products *in situ* of x units of intelligence would be the same at each of the plots F, G, and H; it is unlikely that such would be found in actual experience. G and H would probably differ considerably in potential fertility from F, and from each other, not only in the quantity of products resulting from x units of intelligence, but also as regards the rate of increase resulting from the application of additional units, *i.e.*, though x units might give the same quantity of products *in situ* at F and G respectively, the result of applying $x + z_1$ units might vary greatly at each plot. Another complication arises when, through the growth of other communities, identical plots of land are brought within the range of possible sources of supply to two or more communities. In such event, the conditions affecting accessibility in any one of such communities have to be taken into account in all the others, with which it is thus brought into relation. The nature of some of these complications will be considered subsequently.

Several unreplenishing objects illustrate similar principles, governing their relative accessibility. Coal, iron, and other minerals and

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metals are found closely associated with other objects, and require to be extracted therefrom. Theoretically complete dissociation is possible, and the whole quantity of the desired mineral or metal existing at any spot can be obtained, but in practice it is found that, past a certain point, the extraction proceeds with increasing difficulty, and the quantity obtained per unit of intelligence continually decreases. At some point it therefore becomes advisable to abandon the process of extraction, and to have recourse (as with the constituents of the soil) to the stores of such object next in order of accessibility. This is aptly illustrated in the South Staffordshire coal field. When the thick coal was first worked, there were such large quantities easily accessible, within an area immediately adjacent to the various workings, that the pits were abandoned, when the most accessible portions of the coal had been extracted, leaving underground large masses of the mineral called ribs and pillars. Continuous working has nearly exhausted this fine seam, and the degree of accessibility at which it ceases to be remunerative, is now determined by the quantum of intelligence necessary to extract distant coals, and transport them to the district. Consequently, not only are all virgin

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portions of the seam now worked so as to completely extract them, but fresh pits are sunk, in order to extract the ribs and pillars, which, in former days, had been abandoned as insufficiently accessible.

To make clearer the foregoing conclusions, as to the effect of variations in the degree of intensity of production upon the several classes of natural objects, we will show them diagrammatically, by what we will call Lines of Production.

The rectangular space, opposite each degree of intensity in the diagram, is intended to show, by the intersection of the downward lines, the relative production, per unit of intelligence, with the inventive faculty inoperative. The history commences at the top of the diagram, and the top portion indicates the effect, on typical natural objects of each class, of a continuous rise in the degrees of intensity of production from 1 to 20. At that point we suppose retrogression to set in, and the intensity falls back from 20 to 1.

Unity of intensity, in the diagram, may be taken to represent any assumed number of units of intelligence, applied to the evolution of products, from typical natural objects, in the

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state for the time being of human knowledge. With undiminishing objects, (line A A) the tendency of a rise in the degree of intensity is a continuous increase in the production per unit of intelligence, *i.e.*, in the surplus ratio; the tendency would not be so regular as the diagram indicates, as the benefits of more complete division of labour would not accrue strictly *pari passu* with the rise in the degree of intensity. After the highest degree of intensity, in our hypothetical history of this class of natural objects, is passed, retrogression at the same pace as the former progression sets in, and the quantitative results simply retrace their former steps, as shown in the lower part of the diagram.

With a typical unreplenishing object, (line B B) the tendency of a rise in the degree of intensity of production is represented by an irregular curve; the first tendency, as with undiminishing objects, is towards an increase in the surplus ratio, or quantitative results per unit of intelligence, similarly due to the benefits of division of labour, but, with a continuous increase in the scale of production, the point is reached, at which these benefits begin to be neutralised by decreasing accessibility; then

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for a time the line may wave, in the contest between increasing division of labour and decreasing accessibility, and, ultimately, the latter overrides the former, and the quantitative results per unit of intelligence decrease. In the second part of the history, when the degree of intensity falls, the benefits of division of labour are gradually lost, and, concurrently, the accessibility continues to decrease, so that, when unity is again reached, the quantitative result per unit of intelligence is very much less than when the history began.

With a typical replenishing object, (line C C) the tendency of a rise in the degree of intensity of production is also represented by irregular curves. At first the effect is the same as with undiminishing objects; the benefits of division of labour accrue, up to the point at which the demand overtakes the recuperative powers of nature, at the most favourable site; then there is a set back, with continually diminishing results, as nature is successively overtaken at the second, third, fourth, and fifth points. When the fall in the intensity sets in, the quantitative results per unit of intelligence begin to regain what was lost, *pari passu* with the rate of such loss; but the recovery will be limited to the

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best results obtainable at the most favourable site, where the reproductive powers of nature have not been absolutely destroyed, and, from that point, the continued fall in intensity of production will operate, as with undiminishing objects, to reduce the quantitative results per unit of intelligence; when unity is reached in the falling intensity, such results will be smaller, than those which obtained at the commencement of the history. The diagram has been constructed on the hypothesis that the reproductive powers of nature were, during the rise in the degree of intensity, absolutely destroyed, at some of the most favourable sites existing at the commencement of the history.

It will be well to repeat here, what was stated in first defining these classes of natural objects, that they must be regarded simply as types, which modulate into each other. Timber, as before stated, is strictly a replenishing object, and the trees of quick growth have the characteristics thereof; but the time required to bring timber to maturity varies, from fourteen to fifteen years for larch poles, to the centuries required for the giant trees of California. While the former, when not planted, but left to the haphazard of nature, may be regarded as

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typical replenishing objects, the latter, in relation to Human Economics, are practically unreplenishing objects; between these extremes are numerous varieties, each requiring a different period of growth. Let us suppose that the line of production, C C, in the diagram, represents accurately the effect of variations in the degree of intensity upon larch poles, and the line of production, B B, the like effect upon Californian pines. Between these two extremes exist all the other varieties of timber, the effect upon which of variations in the degrees of intensity would not be represented correctly by either of the lines B B and C C, but by something between the two, and, if we traced the line of production of each variety, we should indicate those coming quickly to maturity by lines approximating to C C, and those requiring more extended periods by lines losing with such extension, more or less, the irregularities of C C, and approximating to the steadier curve of B B. Further, coal and gold are both properly classed as unreplenishing objects, and coal, as we have seen, over lengthened periods manifests the characteristics of its class. But, in relation to any probable consumption, the amount of coal of equal accessibility is so large, that the effect

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of using up the most accessible portions is hardly noticeable from year to year. Thus the economy, from increased divisions of labour, is scarcely checked, and, with any rise in the degree of intensity, the line of production approximates to that of undiminishing objects. Gold, on the other hand, is an unreplenishing object, which, on the present scale of production (apart from the discovery of fresh deposits, and improvements in machinery, which are excluded from present consideration), would mark quickly a curved line of production, and, with any increase in such scale, the radius of such curve would rapidly shorten.

To represent diagrammatically the tendency of variations in the degree of intensity, a separate line would have to be drawn for each object, as probably no two natural objects would be identically affected.

Every replenishing and unreplenishing object, from the action of the opposing tendencies, at some degree of intensity of production gives the highest quantitative results per unit of intelligence. This degree in the production of an unreplenishing object would vary from time to time, as the more accessible stores became exhausted. With a replenishing object, it would

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be stable at the point, where the degree of intensity corresponded to a scale of production which just balanced the reproductive powers of nature, at the site most favourable for the time being. Such degree of intensity we will call the *economical point* of an object.

The number of products into which only one natural object enters is, under the conditions of civilised life, comparatively small and unimportant. We exclude from consideration the atmosphere which we breathe, as the starting point of the problems of Human Economics is the existence of a being, endowed with human faculties, in the conditions which render the continuance of existence possible; without the atmosphere existence ceases practically immediately, and, while not attempting to draw a sharp logical line between this and other necessaries of existence, we commence our investigations with a breathing individual, in the environment enabling him to breathe. Circumstances arise in which an individual would exert every faculty he possessed to acquire needed air, and such circumstances illustrate some of the problems of value which enter into Cosmopolitan Economy, but they are so exceptional that they need not now concern us.

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Primitive man, like bees, doubtless evolved and consumed many products, into which only one natural object entered, such as nuts and wild fruits, consumed *in situ*, or transported to the place of consumption by human force only. To a small extent such products are similarly evolved and consumed at the present day, and the result of variations in the scale of production would be indicated by a line of production approximating to C C, in the diagram. Practically all products now consumed in civilised communities are compounded of two or more natural objects, which enter into them as the base of the ultimate product, or as part of the force or implement, by means of which the products have been evolved and transported to the place of consumption.

Such products, compounded of two or more natural objects, will obviously be affected, like their constituent parts, by variations in the intensity of production. The product will absorb into itself the tendencies of its several parts, in the proportions in which such several parts enter into it, and the line of production of such product will be the resultant of such tendencies, conflicting or co-acting in such proportions. Thus, let us suppose a product com-

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pounded of an undiminishing and an unreplenishing object, whose lines of production are represented respectively by the lines A A and B B of the diagram, and that in such product three-fourths of the former enter, and one-fourth of the latter. With a rise in the intensity of production the line would bend outwards, until the degree was reached where B B begins to curve; then, as the increase in the scale continued, a slight curve would be shown, gradually shortening its radius, but to a slight extent only compared with B B, owing to the predominating tendency of A A. If in the product the constituent proportions were reversed, viz., one-fourth A A and three-fourths B B, the effect of a rise in the intensity of production would be indicated by a sharper curve, approximating to the line B B. We have suggestively indicated these two conditions, by a line of crosses to indicate the product $\frac{3}{4}$ A A + $\frac{1}{4}$ B B, and a line of dashes similarly to indicate the product $\frac{1}{4}$ A A + $\frac{3}{4}$ B B. The effects of a fall in the intensity of production are shown in the lower part of the diagram.

We proceed to summarise the conclusions drawn in this chapter :—

Human powers of production are limited.

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The ultimate aims of Human Economy can be attained only, when production is more than sufficient to maintain the community.

The extent, to which such ultimate aims can be attained, depends upon the greater or less surplus ratio of products.

Natural objects utilised in production are appropriated in the order of their relative accessibility.

The raising of the degree of intensity of production tends to increase the surplus ratio, by effecting savings in the application of intelligence to production.

As regards undiminishing objects, such tendency would continue *ad infinitum*; as regards unreplenishing objects, it would be checked by decreasing accessibility; as regards replenishing objects, it would be checked when the recuperative powers of nature, at the most favourable site, were trenched upon.

In so far as replenishing and unreplenishing objects enter into production, there is a degree (called the Economical Point) of intensity, at which are obtained

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the highest quantitative results per unit of intelligence.

The effect of intensity of production upon products compounded of two or more natural objects, will be the resultant of its tendencies as regards the several constituent parts.

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CHAPTER VII.

OBJECTIVE LIMITS OF PRODUCTION.

AFTER our investigation of the natural laws controlling the evolution of products by the human species, we now approach the second subject of enquiry, indicated at the commencement of the last chapter—To what particular products will those limited powers of production be applied? Psychological causes enter into this problem, but there are extrinsic factors which must first be considered. Before determining what particular products will be produced, we must first ascertain what can be produced.

Reviewing the three economic conditions noted in the last chapter (see page 63), alike possible for bees and human communities, the second condition was explained to be a state of productive equilibrium, in which the workers produced enough to maintain themselves and provide for their own depreciation; and when, in a human community, production rises above

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that state, the surplus may be applied (1) wholly in improving the standard of existence, (2) wholly in increasing the numbers of the community, or (3) partially to each of those ends. The power to evolve products improving the standard of existence marks a dividing line between bees and humanity, and, at that point, it is necessary to draw a theoretical distinction in human products between what we will call *Staples* and *Non-Staples: Staples* being the products necessary to the existence of the individuals of a human community, in the state for the time being of civilisation ; and *Non-Staples* being all other products.

We have called the distinction theoretical, because the state of civilisation is for ever changing, and with it change the products necessary to existence. In these islands, to go back no further than the pre-Roman period, the physical qualities of the community have slowly changed with the constantly improving standard of existence, so that the greater number would now perish, if the products, on which their barbaric ancestors lived and multiplied, were alone available. In a declining civilisation, on the other hand, the more hardy individuals survive, and the community in successive generations

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acquire physical qualities enabling them to thrive under deteriorated conditions of existence. In an improving community, some non-staples are thus continuously becoming staples, and, in a declining community, staples from time to time change to non-staples.

The history of mankind shows that staples are mainly vegetable products, or directly dependent thereon. Thus, in the hunter stage of civilisation, staples are either wild graminivora, or carnivora, which in their turn subsist, either directly or with one or two removes, on graminivora; in the herdsman stage, staples are almost entirely graminivora; in the agricultural stage, selected vegetable products become the chief staples, graminivora occupy only the second place, while carnivora are but scantily produced. As civilisation advances, dependence upon the products of the soil thus becomes more direct and complete. Throughout the history of the race there have been, doubtless, some communities, whose geographical surroundings have made them mainly dependent upon fish, and who are thus exceptions to the general rule, but, compared with the whole race, these exceptions are few and unimportant.

The habits of a community change slowly as

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civilisation advances or declines, and, with such changes, also vary the quantity and kind of vegetable products *per caput*, entering into the staples required. In different co-existing communities, also, the habits and states of civilisation vary greatly, inducing corresponding variations in the quantity and kind of vegetable products entering into staples. The quantity and kind of staples required *per caput* thus varies, in the same community at different periods, and in different communities at the same period.

Apart from the slow changes due to advancing or declining civilisation, the possible consumption of staples of each community varies from year to year, within slight deviations, *pari passu* with the number of individuals in the community. Food and clothing are the two principal staples. The human body is limited in its capacity for absorbing food, and cannot carry with comfort more than a certain amount of clothing. The consumption is, therefore, fairly proportionate to the number of consumers, the limits of deviation being the extra quantity of food consumable through gluttony, on the one hand, and, on the other hand, the margin in quantity of food and clothing between what a

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poor individual would consume, and what he can exist upon. But the gluttons, who thus affect the consumption, are few, and the number of poor, who do not get sufficient food and clothing, is a small proportion.

What economists consider waste is mainly in respect of quality, not quantity. Men and women of luxurious habits do not consume much, if any, more in quantity than the poorer classes, and the consumption of articles of fine quality, by a portion of the community, does not materially affect the proportion between population and the quantity of staples consumed. It involves only that a number of individuals, living on plain staples, shall manipulate a small quantity of similar staples, in ways to suit the luxurious taste of a few. The consumption of staples will be the same as if the luxurious few consumed plain staples, and fed and clothed gratuitously the manipulators. An example will illustrate this: Let us suppose a man of wealth, living on an island with an establishment of 600 cooks and 600 tailors, engaged entirely in preparing his food and clothing in luxurious fashions; that would be an example of excessive waste, but, to maintain such an

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establishment, he would have to purchase staples sufficient for 1,201 individuals—1,200 separate portions of which would be consumed by his servants, while they were fashioning the remaining portion consumed by himself.

This is further illustrated by our fellow-creatures, the hive-bees, in working out the ends of bee existence. Small quantities of a food, more costly, so to speak, than the staple honey, are required for the nutrition of the princesses, and certain members of the community are told off to elaborate this product, which apiarians call royal jelly. The amount of honey consumed, however, is the same as if the princesses were fed on the staple honey; and with bees, as with mankind, the consumption of staples is proportioned to the numbers of the community, producers, queens, grubs, drones, and ministers to luxury, all included.

Within the small limits of deviation mentioned above, the consumption of staples will, therefore, rise and fall with the numbers of the community. The production of staples will similarly rise and fall, as, subject to the accumulation of reserves against bad seasons, no purpose can be served by producing staples, which cannot be consumed. If, for example,

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one-sixth of a community produce as much staples as the whole community can consume, the remaining five-sixths will not obviously devote their faculties to producing staples, which are not wanted.

On this point, also, we get instruction from bees, whose instincts prevent them accumulating staples in excess of possible consumption. The one outlet for surplus production with bees is, as before stated, the increase of the species. While it is possible to gratify this propensity, the bees are never idle, but continue to produce staples and to send off fresh colonies, as quickly as the surplus production will allow. But no colonising takes place in this country after the month of July, natural selection doubtless having demonstrated that later swarms ran great risks of perishing from starvation. After this only outlet for surplus products is closed, the bees regulate their further production of staples by their possible consumption. If, when the colonising time is past, a favourable period for the collection of honey follow, there ensues what apiarians call a honey glut; the bees fill their combs sufficient for the winter consumption, and then hang about the hive luxuriously idle.

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The potential degree of intensity in the production of staples therefore depends upon the number of the community, and rises or falls with any increase or diminution therein. The principal staples among civilised communities are mainly evolved from the several kinds of corn—wheat, rye, oats, maize, etc. We have seen in the last chapter that, in the state for the time being of human knowledge, all products into which only replenishing and unreplenishing natural objects enter, or in which they predominate, have economical points. Corn, in common with all vegetable products, consists partly of the constituents of the atmosphere, which are undiminishing objects, and the question arises, whether the continuous gain in that class of natural objects, by successive rises in the intensity of production, might, *ad infinitum*, more than balance the losses accruing when the economical points are passed, in the other two classes of natural objects entering therein. This point has, to some extent, been anticipated in our examination of the relative accessibility of unreplenishing objects (page 79), and it is only necessary to add that the hypotheses, which are there used as illustrations, are demonstrated as facts, by the experience of

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what are called new countries, *i.e.*, countries, which have suddenly advanced from the hunter to the agricultural stage of civilisation. It is there open to producers, either to raise the intensity of production on cleared plots, or to continuously extend the cultivated area at lower degrees of intensity. If the former gave even the same proportion of surplus to gross products as the latter, it would be preferred, because of the saving of the cost of clearing and of transport of the product. But the result of experience in such countries is that, with wheat for example, a degree of intensity equal to a gross product of fifteen bushels per acre or less gives the highest surplus ratio, whereas in this country, Holland and Belgium, the degree of intensity on soils of not higher natural fertility is equal to a gross product of about thirty bushels per acre.

It thus appears that, notwithstanding the extent to which undiminishing objects enter into the production of the staples of civilised communities, the line of production of such staples would show an economical point, and that the degree of intensity of production in some communities has been carried past that point.

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The production of non-staples can commence only at the degree of intensity in the production of staples, at which surplus products arise, for until intelligence, the limited element, is released from the production of staples, none of it can be available for non-staples. From that degree, up to the economical point in the production of staples, there would be a continuously increasing quantum of intelligence potentially available for the production of non-staples, and, up to that point, one of the two alternative aims of surplus production, increase of the species, can be attained, with ultimate advancement of the other aim, the improvement of the conditions of existence. The intelligence applied to the increase of the species, by producing staples therefor, would be subtracted from that immediately available for the production of non-staples, but a community which applied its nascent surplus, as far as practicable, to the increase of the species, would sooner attain the economical point of staple production, and would then be in a position to improve the conditions of existence, to a greater extent than another community, which, by applying its surplus products mainly to improvements in the conditions of existence, had kept its numbers

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below the equivalent of the economical point of staples.

Supposing a community to have applied its surplus products concurrently to both aims, at the economical point in the production of staples the problems of production become complex. The lines of production of the various non-staples might not, in all probability would not, be at their respective economical points, at the exact degree of intensity possible at the economical point of staples. The three possible conditions are that the economical point of non-staples might then (1) have been just reached, (2) have been passed, or (3) not have been attained. Condition (1) presents no difficulty, condition (2) is only theoretical, for non-staples are as numerous and varied as human desires, and, at the economical point of one class of non-staples, the further intelligence available could be diverted to another, or the labourers could enjoy rest, in itself an improvement of the conditions of existence. Under condition (3), it might be to the advantage of the community to increase the species beyond the equivalent of the economical point of staples, as the economical point of staples and non-staples combined might be at a degree of intensity beyond that

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of staples. This will appear clearer if illustrated by figures. Let us suppose a community of 100,000 to represent a density equivalent to the economical point of staples; and, of such community, let us further suppose at that point one-fourth, or 25,000, can produce staples for the whole community, and three-fourths, or 75,000, are engaged in the production of non-staples. The numbers of the community, we will next suppose, are increased by 10,000, but, under the harder conditions of production, one half of such increase is required to produce the additional staples required, leaving only one-half of the increase, instead of three-fourths, to join the producers of non-staples. The community will now consist of 110,000, of whom 30,000 will be producers of staples, and 80,000 producers of non-staples. The increased intensity in the production of non-staples, corresponding to the 5,000 additional workers, may have carried such production nearer the economical point, so that the produce of the 80,000, divided among the 110,000, may give a larger dividend of non-staples, than the produce of the 75,000, divided among the 100,000.

A short examination is necessary of the meaning attached to the word "community,"

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in relation to Human Economics. In Apiarian Economics a community means a hive, *i.e.*, a collection of individuals working for certain common objects, and with no economic relations with individuals of the species outside itself. Several hives may be situated side by side, and one element of production, natural objects, may be common to all; but, immediately that element is appropriated and combined with force and intelligence, the resulting product is dedicated to the objects of the community, to which the force and intelligence belong. There may be sections within the community, splitting it up into smaller aggregates of individuals, in some sense, mayhap, mutually antagonistic. Of this with bees we can know nothing, but, whatever may be the individual rights, we see the whole products of the hive applied to the sustenance of that hive, and to the increase by that hive of the species, without aiding or being aided by the individuals of any other community.

This complete economical separation of communities does not exist in Human Economics. If we imagine, again, the denizen of another sphere, unable to communicate with us, but examining us as we examine hives of bees, he

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would see large aggregates of individuals engaged in America, India and Australia, producing food staples for consumption in England, and he would see similar aggregates in England engaged in the production of tools and clothing, for consumption in America, India and Australia. This would lead him to the conclusion that the whole earth was one community, engaged in altruistic co-operation for common objects. Such is the ideal of cosmopolitan economists, but we denizens of the earth know that sections of the human race seek to cut themselves off from productive co-operation with other sections, except in so far as it will tend to their own selfish advantage. Notwithstanding the artificial barriers which are created with this object, however, co-operative productive relations, to some extent, obtain between all parts of the civilised world, and a community, self-contained and separated like a hive, does not exist. Nations and districts, however, approximate to the condition of communities, and the results indicated above, in the theoretical community of 100,000 persons, may be predicated as tendencies for the existing imperfect communities, with partial mutual relations.

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To give a concrete form to the idea of an economical point of staples and non-staples combined, let us imagine a self-contained community, in the present state of civilisation, residing in the island of Great Britain. The island, we will further suppose, has the natural resources necessary for the production of all staples, and of the non-staples appurtenant to the existing degree of civilisation With its varied geological structure, in some districts the production of staples require a less expenditure of intelligence than in others, and some districts are similarly more favourably situated for the production of implements to aid in the production of staples, and for the production of non-staples. In an island so large as Great Britain it is evident, that to transport staples and heavy implements and non-staples from place to place consumes an appreciable quantity of intelligence, *i.e.*, appreciable in relation to the consumption of intelligence in the actual production of the staples, implements and non-staples at the site of production. Let us suppose, that there are three potential manufacturing centres for the production of implements and non-staples, situated respectively at Birmingham, Leeds and Glasgow, and

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that all the rest of the island is agricultural, *i.e.*, engaged directly in producing staples and the raw materials for non-staples. Let us further suppose that the production of implements and non-staples first settled in Birmingham, which at the time of our hypothesis has become a large city. Starting from Birmingham, the demand for staples for its manufacturing population would, for the reasons laid down in Chapter VI. (see page 79), cause the cultivation of the soil in areas of diminishing intensity, bounded by the circumference of a series of concentric circles, of which Birmingham would be the centre. Subject to variations in the fertility of the soil, the degree of intensity applied twenty miles north of Birmingham, would be the same as the degree twenty miles distant from Birmingham, in any other direction. Southward from Birmingham, where the district would not come within the influence of any other manufacturing centre, the intensity would, subject to relative fertility, continuously diminish as the distance from that city increased. In the surrounding districts immediately contiguous to Birmingham we should find intense production, using up comparatively a large number *(a)* of units of intelligence per acre in

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production, giving a large gross product, *(b)* in staples per acre, also a large net product, *(c)* per acre, after deducting the consumption of the units of intelligence employed in production, but the net product, $\frac{c}{a}$ per unit of intelligence would be smaller, than when the intensity of production was less. As the distance from Birmingham increased, the units of intelligence per acre, and the gross product at the sites of production would (subject to relative fertility) both be smaller, say, $(a - z)$ and $(b - y)$ respectively, producing a net product per acre d, which might be smaller than, equal to, or larger than c, but $\frac{d}{a - z}$ would be greater than $\frac{c}{a}$ to provide for the transport to Birmingham, which transport, we will suppose, would use up e units of intelligence consuming f staples. Then the proximate and distant zones would be cultivated to such degrees of intensity respectively that $\frac{c}{a}$ should equal $\frac{d - f}{(a - z) + e}$, which would be the economical point of the two zones combined.

The hypothetical concentric areas surrounding Birmingham we will number according to their relative distances from the common centre. Zone No. 1 would be a band of cultivation immediately surrounding the inhabited and manufacturing centre; the breadth of the band would be

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such that the consumption of intelligence, in transporting across it implements and staples, was a negligible quantity. Around this, we must suppose, concentric bands, numbered 2, 3, 4, 5, etc. Zone 2, would commence where the consumption of intelligence in transport first became a noticeable factor, and Zone 3 would begin where the increase of such consumption, over the like consumption where Zone 2 commenced, similarly became a noticeable factor. Having regard to the effect of intensity, production would at first be confined to Zone 1 and the line of production (see diagram) would extend outwards as the degree of intensity rose, up to a certain point, and then would commence to bend. Apparently the economic point would then be reached, but not so necessarily. In the existing condition of civilisation, the cultivation of Zone 1 alone might involve the production of implements in aid of cultivation, to a degree of intensity far below the economical point of such implements. The cultivation of Zone 2 might raise the degree of intensity in the production of such implements, so as to effect a material saving in the intelligence entering into the final product. This saving would react upon production in Zone 1: the two zones

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would, notwithstanding, be cultivated to the respective degrees of intensity that $\frac{c}{a} = \frac{d-f}{(a-z)+e}$, but $\frac{c}{a}$ at the economical point, under these conditions, would be larger than $\frac{c}{a}$ at the economical point of Zone 1, cultivated alone. In other words, the economical point of Zone 1 and 2 combined, after allowing for the burden of transport on Zone 2, might give net products per unit of intelligence equal to or higher than those obtained at the economical point of Zone 1, cultivated alone. Similarly, Zones 3, 4, 5, etc., might also be brought into cultivation, with consequential savings in intelligence in the production of implements, and also in the transport of the products of Zones 2, 3, 4, 5, etc.

The point would be reached, at last, at which any further rise in the degree of intensity in the production of implements would not, in Zone 1, give increased net products of staples per unit of intelligence, *i.e.*, that $\frac{c}{a}$ would become smaller with higher intensity; nevertheless, the economical point of production for the community might not yet be reached. First, as regards staples, the net products of Zone 1 at this point might have become insignificant, in regard to the production

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of staples for the whole community, and the gain, by further increased intensity at the remoter zones, might more than counterbalance the reduction in the net product per unit of intelligence at Zone 1. The economical point in the production of staples would not be reached, until the losses, by increased intensity in the proximate zones, outweighed the gains from the same cause in the remote zones.

But the economical point, as regards staples, might not be the economical point for staples and non-staples combined. As pointed out above, the saving from increased intensity in the production of non-staples might more than compensate for the reduced net product per unit of intelligence in staples alone.

Pursuing the development of our hypothetical community, let us suppose that, after the area of cultivation dependent on Birmingham had extended over the whole of England, discovery was made that the site of Leeds offered exceptional advantages for the production of implements and non-staples. Their manufacture would then commence, tentatively at first, because of the great advantages possessed by Birmingham through intensity of production. The heavier implements would probably be first

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produced, the transport of which would be an important factor, and the Leeds implements would doubtless first be supplied to the district immediately to the north of Leeds, where the advantage in respect of transport, compared with Birmingham, would be most marked. This would react on the agricultural zone immediately adjacent to Leeds, and would approximate the degree of intensity in the production of staples in that zone, to that obtaining in the zones nearer to Birmingham. The area thus brought under the influence of Leeds would be withdrawn from the influence of Birmingham, and gradually, with increased intensity in the production of implements and non-staples, the whole of the country north of Leeds would be similarly withdrawn; the influence of Leeds would also presumably extend into Scotland. Some zones southward of Leeds, brought under its influence, would touch those remaining under the influence of Birmingham, and these would be perpetually tending towards one or the other centre, as its advantages in production relatively advanced or receded. The effect of the growth of Leeds on the production at Birmingham would depend upon whether, in the whole district previously

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under Birmingham influence, the economical point in the production of staples and non-staples had been reached. If such point had not been reached, increased intensity of production would be applied to all the zones and parts of zones remaining outside the influence of the new centre. If such point had been reached, a new economical point would, in the absence of fresh disturbing causes, probably be worked out at some lower degree of intensity in the production of staples, but the lowering tendency would be checked by the disadvantage of diminished intensity in the production of implements and non-staples.

After Birmingham and Leeds had been thus developed, we may suppose the history of Leeds to be repeated at Glasgow. It is not necessary to trace again the effect of the rise of a new centre; it is evident that it would affect the economical point both at Leeds and at Birmingham, the latter through the districts on the borderland between the influence of both those centres.

The foregoing illustrates the principal factors in operation in raising production, in a self-contained community, to the economical point. In any community of the supposed extent,

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the actual working out would be much more complex than the illustration. Certain districts would be found to be specially suited for the production of particular staples or non-staples, which would cause the growth of numerous centres of population, in lieu of the three only which we have supposed. This would affect the production of other staples in the contiguous districts, from which each centre drew its supply, and that would react upon the districts supplying other centres. Under the law of diminishing returns, however, it is evident that, in the absence of any fresh disturbing cause, at some degree of intensity of production, *i.e.*, of density of population, the economical point of staples and non-staples would be reached.

But, in Human Economics, the theoretical economical point of the supposed community would not be stable. There is one cause—the inventive faculty—the effect of which cannot be forecast and which is continuously tending to push such point to a higher degree of intensity. Its aids to production consist, as has been stated in a previous chapter, mainly in economising the consumption of intelligence in production, whereby the same quantity of intelligence can apply larger quantities of force. In

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a particular condition of civilisation, let us suppose that two units *(2a)* of intelligence could apply *b* units of force, with resulting net products amounting to *c*, and that higher intensity in that condition would cause net products to increase in the following scale :—

2a applying *b* would give *c* net products.
4a ,, *3b* ,, $c + d$,,
6a ,, *6b* ,, $c + \frac{3}{2}d$,,

Let us assume *d* to be less than *c*, and that the degree of intensity indicated by the first line is the economical point. Now, by the operation of the inventive faculty, let us suppose that two units of intelligence, *(2a)* can control *6b* of force. Two such units would then be able to work up to the same degree of intensity as six units, under the pre-existing conditions, but the net product of such two units, under the new conditions, would be greater than $c+\frac{3}{2}d$, the net product of six units under the former conditions, by the amount consumed by four units of intelligence during the process of production. In this way entirely new factors would enter into the problem, which would push the economical point to a higher degree of intensity, than that under the pre-existing conditions.

Another cause tending to the instability

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of the economical point is the incomplete separation of communities, which has already been noted. Implements and non-staples are produced in this country at a higher degree of intensity, than is called for by the population of the country, in order to exchange for the staples and non-staples of other communities. This reacts on the production of staples in this country, and affects the economical point, in a manner similar to the growth of a new centre of population within the community.

The conditions of existence cannot be improved beyond the state corresponding to the economical point, for the time being, of staples and non-staples. Up to that point, the continuous increase of population could be accompanied by a possible continuous improvement in the conditions of existence, and any falling back from, or passing beyond, such point would result in a diminution of the possible quantity *per caput* of the products constituting non-staples, *i.e.*, in the deterioration of the material conditions of existence. This highest possible production of non-staples is, however, never attained, because material products are not the only means, by which humanity deem they can improve the conditions of existence. As will

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be shown in the next chapter, many prefer indolence to material products. Sometimes this desire for indolence becomes characteristic of a community, who, when the means of existence are provided, seek only indolent ease and the propagation of their species. In other communities a desire for immaterial pleasures grows up with improved conditions of existence. The Arts and Literature are cultivated in lieu of the non-staples, which, in a purely industrial community, might be produced. We are not arguing, of course, in favour of a purely industrial community, which would probably lead to as dull, blank, miserable state of existence, as it is possible to conceive.

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CHAPTER VIII.

SUBJECTIVE CAUSES AFFECTING PRODUCTION.

E now enter upon the question—To what particular products will the limited productive powers of humanity be applied? In the last chapter only the preliminary enquiry has been pursued: To what *can* such powers be applied? The objective laws controlling the possible relative production of staples and non-staples, and the relation thereto of the economical point and the density of population have been reviewed. We have now to consider the subjective enquiry: With such possibilities, what will the human race do? As free agents, it is obvious that the individuals may either produce or not produce, may procreate the species or may let it die out, may stop short of, attain, or go beyond, the economical point.

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In this investigation, as before stated, we get little light from Apiarian Economics. We see that the whole energy of bees is directed, first, to existence, and, secondly, to the increase of the species; but what motive impels the workers, who are also the rulers of the hive, to the second of these ends, we cannot guess. It is something differing essentially from human motives, as, in co-operating for such increase, the working rulers fill the parts only of providers and nurses.

In determining human motives, we have to base our enquiry on the postulate that other members of our species are constituted with passions, appetites, and desires like to, though not identical with, those of ourselves; but we have strong collateral evidence of the truth of this, in the common basis of the laws of civilised communities, framed to control the gratification of such passions, appetites, and desires, and in the consensus of approval of the works of eminent psychologists, poets, novelists, and others, who have analysed and pourtrayed human motives.

For brevity's sake, we will collect all these

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human passions, etc., under the head of

> IMPULSES, which we will define as all passions, appetites, and desires, the satisfying whereof affords pleasure to the individual.

The pleasure may be either physical, moral, or intellectual.

Disregarding, as a negligible quantity, certain religious fanatics, we note that the gratification of impulses involves the consumption of products, or of the elements of production, for, unless an individual is consuming, he must simply die. By introspection and by history we find that some impulses dominate, so that, when it becomes necessary for a number of individuals to choose between the alternative gratification of different impulses, we can foretell, with unimportant exceptions, on which the choice will fall. It follows that the products, required for the gratification of these dominating impulses, will have the first call upon the productive powers of a community.

There are two of such dominating impulses, which, while of unequal strength, are each more powerful than all others. These we will distinguish as primary impulses. They are—

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(1) the impulse for a prolonged life, and (2) the sexual impulse. Modern naturalists have shown us the reason for the strength of these impulses. The first unquestionably is supreme; the wretched conditions, under which individuals will cling to life, indicate that this impulse is based rather on an inherited instinct, than on reason. Among the helots of slave-making nations, we find individuals will continue to exist in a state of hopeless misery. In the great cities of civilised countries, life is endured under circumstances of almost equal misery and degradation. Shipwrecks and mining accidents, involving the fearful pangs of thirst and slow starvation, also show how tenaciously our species clings to life; even murder and cannibalism are resorted to, in the ultimate struggle for existence. There are some individuals who prefer death to life under hard conditions, but such are exceptions.

The second dominating impulse, the sexual, is also one which, from the teachings of modern naturalists, we should expect to find strongly impressed by inheritance in all progressive nations. In the use of the term we include the desire for offspring, and in estimating the force of this impulse also, we have not to deal with

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exceptions. Its active operation in perhaps every nation, except France, is daily proved, when we see that children are procreated, though the birth of every additional child proportionately deteriorates the conditions of existence of the parents.

Looking at communities as a whole, we find that the primary impulses exert their power very much in the same direction as the objective laws of production, and, up to the economical point in the production of staples, co-operate in increasing the density of population. A point at which such impulses and laws are opposed is in the prolongation of life after individuals have ceased, from age or disease, to be producers. In a purely economical community such individuals would be put out of existence, like the drones, who are destroyed by the worker-bees, as soon as they have completed their part towards the accomplishment of the aims of the community.

In Human Economics, when surplus products are potentially available, a number of secondary impulses spring up, all bearing on the improvement of the conditions of existence. Tastes are as various as individuals, and these secondary impulses are in their nature equally diverse; but,

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for the most part, they centre around a desire for luxurious ease. To gratify the primary impulses, mankind endure uncongenial labour; thereafter they will be impelled towards ease and luxury, not necessarily towards indolence solely, or towards indulgence solely, but, according to individual tastes, perhaps to an equal enjoyment of ease and luxury, perhaps to the sacrifice of ease to luxury, or of luxury to ease, perhaps to the pursuit of favourite but unremunerative occupations. There are, indeed, some cases in which the labour, at first uncongenial, undertaken to gratify the primary impulses, has become a confirmed habit, and men have got to love the work for itself. But such cases are so exceptional as not to interfere with the general direction of the secondary impulses.

The varying character of these secondary impulses among different nations is an important factor in the problems of what we have called Communital Economy. As far as the primary impulses affect production and consumption, the whole species are alike, but past that point, in addition to numberless differences between individuals, we also find inherited differences affecting whole races, and

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constituting national characteristics. These inherited secondary impulses seem to make up a great part of what is called civilisation, and a high state of civilisation appears to require the attainment of a high state of luxury before ease is sought. National characteristics must have become fixed at periods when communities were nearly self-dependent, and communication with other communities was difficult. At those periods, before civilization had taught its numerous wants, the primary impulses, in countries where the staples of existence were in great profusion, could be gratified with little labour, and indolence would be generally indulged in, after the production of sufficient staples. Habits of indolence thus acquired would probably become an inherited national characteristic. A converse process would go on where staples, in the infancy of the inventive faculty, called for continuous labour. The gratification of the primary impulses in such communities would engender habits of continuous industry, which would become also an inherited national characteristic. When the inventive faculty reduced the quantity of intelligence necessary for the production of staples, it would not destroy the habits of industry, and in these

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nations the impulse to luxury would prevail over the impulse to ease. In other districts, as among the Esquimaux and Laplanders, the conditions of existence were so hard, that the primary impulses could never be fully gratified, and the sexual must often have been restrained by the stronger impulse for a prolonged life. Under these circumstances no secondary impulses appear to have arisen. The hard and hopeless conditions of existence appear to have engendered contentment with a hard-working, merely animal existence, out of which there is no desire to advance. The characteristics of communities, varying around these three types, enter into the problems of Communital Economy, and are beyond the scope of the present work. A great fact in the recent history of human economics is the breaking down of communities in relation to production. Men who have inherited certain habits enter upon lands, in competition with those with divergent characteristics. Production in fruitful countries is undertaken by races, who have not inherited the indolence engendered in the past by a too prolific nature. Races contented with hard conditions of life are brought into competition with races, which have inherited habits of luxury. These phenomena

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are seen in the irruption of European and Chinese races into America and Australia.

The gratification of the secondary impulses, and of the primary impulse for life prolonged beyond the potential productive period, involves the consumption of products by thosewho have supplied no part of the intelligence necessary to their production, for, where the laws of the community allow the existence of non-workers, the workers have to produce for such non-workers, as well as for themselves. A prolonged life is accorded, in most civilised communities, by poor laws or by charity, but the secondary impulses can only be gratified by individuals obtaining advantages over their fellows. The whole community cannot exist in luxurious ease, and some must, in opposition to their secondary impulses, produce for themselves and for those who rest. There is one possible method by which this could be avoided, *i.e.*, that each individual should accumulate, by expenditure of his intelligence, stores of staples and non-staples, as large as he would be likely to require in his life, and, after he had ceased producing, draw on such stores as he required; but this would be so cumbrous and wasteful, that the community would lose many of the

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advantages of intensity of production indicated in the foregoing pages, and in no respect would benefit. The earth brings forth its fruits in due season, and, subject to a reserve only for bad seasons, the amount of intelligence necessary can be applied as each season recurs; if, subject to such reserve, more than is required be produced in any one year, intelligence is thereby needlessly abstracted from other potential products for which it is available.

Civilised communities have found it advantageous to encourage industry by institutions giving individuals, who consume less than they produce, a right over future products. This is done by the laws of property and exchange, and by the different forms in which capital is allowed to accumulate. We are not concerned with the machinery but only with the fact that, under such institutions, the incentive to saving is the advantage thereby gained over the workers, so that the workers have to work for the savers, who are thereby enabled to gratify their secondary impulses.

The like institutions and the like motives stimulate the inventive faculty into operation.

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The laws of most civilised states, recognising the benefit to the community of new discoveries in processes of production, and also recognising the desire in individuals to gratify their secondary impulses, seek to stimulate inventors, by giving them, for considerable periods, a benefit from their inventions. The benefit, which would accrue to a man in common with his fellows from any new invention, is not sufficient inducement to devote the toil and thought necessary to new combinations and discoveries. The activity of the inventive faculty is found, *ceteris paribus*, to be greater or less, according as the material benefits likely to accrue to the inventor are large or small. There is no mark by which the potential inventor can be recognised, and the experience of nations has left him to be educed, by the offered reward of an advantage over the working members of the community.

The causes which lead to improvements in the conditions of existence being thus stimulated, by a law-given power to individuals to obtain advantages over the workers of the community, we have next to consider within what limits such advantages can be enforced. The extreme limit would be reached, if the

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workers were allotted only staples sufficient to gratify the impulse for life during its potential productive period, and the sexual impulse, as far as was necessary to maintain sufficient workers to produce staples and luxuries for the privileged section, and in a slave-holding community the state of the workers would approximate thereto. At this point a human community diverges from a hive of bees. In the latter, if we regard the queen, princesses, and drones as the privileged section, we find that they possess among themselves powers of procreation to increase the number of workers practically without limit. In a modern human community, several causes co-act to make necessary the procreation of workers by the workers themselves. First, the luxuries of modern civilisation tend, as is well known, to weaken the generative powers in both males and females, and moreover with the latter means are employed to prevent the gratification of the sexual instinct resulting in the birth of children. Secondly, an inherited love of offspring would prevent parents of the privileged classes procreating children, who would become slaves to the community. Thirdly, having regard to the proportion of

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workers to non-workers, and the period of gestation of a child, it would be a physical impossibility for the numbers of the workers to be kept up by the procreative powers of the non-workers. For these reasons the supply of intelligence in slave-owning communities has to be maintained, by permitting the gratification of the sexual impulse by the slaves themselves.

Slavery is, however, now abolished in all civilised communities, and we have to deal with workers, who are free to work or not work as they please, and who work upon such terms as they can, as free contractors, exact. With them the secondary impulses come into operation after the primary impulses are gratified, and they are not content for the improvements in the conditions of existence to be limited to the privileged classes. The investigation of the methods, by which, under civilized institutions, the workers appropriate a share of such improvements to themselves, falls within the purview of Cosmopolitan Economy, and is beyond the scope of this work, but, from a comparison of different historic periods, it is obvious that, when not restrained by law, the conditions

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of existence of the workers improve with an increase in the surplus ratio. In other words, the tendency is for the surplus ratio to oscillate about a stable point, in consequence of the workers, as the gross products per unit of intelligence increase, either reducing their hours of labour, or requiring a continuously increasing amount of products for their existence and depreciation: if a community be travelling beyond the economical point, and the gross products per unit of intelligence decrease, the oscillation would be in a contrary direction, with the like tendency to return to the stable point of surplus ratio.

The subjective causes influencing production are further affected by the respective shares of individuals in the potential non-staples. If fairly evenly divided among the community, such non-staples would probably take the form of simple luxuries. If the control of the greater part of such products be in the hands of a few, they would take the form of highly costly luxuries for the use of the few. It is under the latter conditions that the highest works of Art have been produced, although there is no insuperable reason why Art should not be equally encouraged in a communistic condition.

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At this point the problems of Natural Economy merge into the province of what we have called Communital Economy, as the direction, in which will be applied the potential increase of products per unit of intelligence, depends in a great measure on national characteristics. An Irishman will increase his species under conditions in which an Englishman or American will only prolong existence; a Chinaman or a Negro will propagate under more wretched conditions than an Irishman. The inhabitants of the temperate zones appear to direct the potential surplus production mainly towards material luxury, the inhabitants of the torrid zones mainly towards ease.

The direction, in which such potential surplus production will be applied, is also greatly affected by the widely diverse institutions of different communities, which are also beyond the purview of this book. The investigation of the subjective and objective causes in this and the preceding chapter will not enable us to go farther than the following general conclusions: That the potential productive

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powers of each community will be applied :—

First ;—To the production of staples proportionate to the numbers of the community.

Secondly ;—To the production of non-staples, in the nature of semi-luxuries, which, according to the habits of each community, the producers require to propagate ;

and thereafter, according to the habits and tastes of each community and to its institutions, production will cease, or will be directed to gratify the diverse luxurious impulses.

THE END.

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The want of durability of modern printing papers makes the re-sewing of books a more or less destructive operation.

The greater number of books now issued, in various, and oft-times artistic cloth covers, soon come to pieces, although the material of which the covers are composed is usually **of sufficient strength to last out the ordinary life of the book.** The fault lies in the method of attaching the book to its cover, which has hitherto been mechanically unsound.

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The cheapening in the methods of production of the paper and binding of books is in reality a false economy, hurtful alike to the reader, the author and the publisher, for where a penny is saved in the first instance, a shilling or two are afterwards lost. If all books issued by the publishers were cased **in such a manner as to last their natural lives as originally issued,** an enormous saving would in the end be effected, and the money so saved would be available for the purchase of more books, to the mutual benefit of buyer and seller.

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As a matter of fact, a **cased book** is converted into a **bound book** without any material increase of price, say one penny per crown 8vo. volume of the size of the ordinary six shilling novel.

As an instance of actual cost, a small edition of "The Diseases of Women," by Lawson Tait, F.R.C.S., was bound (or cased) in accordance with the Patent Specification, for Messrs. Cornish Bros., Booksellers, of Birmingham. The book is a crown octavo, of upwards of 300 pages. It was sewn by hand, forwarded in the best possible manner, and covered in ordinary bookbinders' cloth, at a cost of 4½d. per volume.

The new binding has been put to very severe tests, and it has been found that **no two men have yet been able fairly to pull cover and book apart.** For school books, legal and other hand-books, and popular novels supplied to the large libraries, the new method will be found particularly beneficial. In a library such as Mudie's, where thousands of volumes are sold off annually, great economy must be effected, as the expense of repairs and re-sewing will be saved, and in every library there will be a considerable saving in the matter

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of binding. It must also be remembered that a rare book in its original covers is invariably worth considerably more than one that has been re-bound.

The advantages may be summarised briefly as follows :—The need of an improved method of covering books is universally admitted. The new method is efficacious, exceedingly simple ; and the cost of production, beyond that of the present defective method, is merely nominal.

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The **Lawyer,** the **Doctor** and the **Professional Man** generally should order his particular *vade mecum* in "Amplex" covers. The **Student** should endeavour to get an "Amplex" bound book for his next purchase.

The expense of re-binding books is not the only consideration. Most of the **modern printing papers are mainly composed of wood pulp**, and even in the folding of the sheets the paper will almost crack. Taking books to pieces for re-binding, and stripping the glue from the backs, often causes many of the sections to split into single leaves. The binder has to resort to "whip stitching," with the result that if a book so treated is handled by a careless reader, many of the leaves will soon become detached and probably lost. **The cost of the binding is thus absolutely thrown away,** the only remedy for which has hitherto been the buying of books in the quires and having them properly bound. The cost is probably 1/9 per volume, when a 4½d. cover, properly attached by the "Amplex" method, looks nicer, and answers every purpose.

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The "Amplex" Binding Company **do not wish to remove trade from local centres.** All respectable binders will be licensed to work the process, but if the book buyer is unable to obtain his books in "Amplex bindings, it may be found necessary for the Company to provide them. The economy is so great and the extra initial **cost so small,** that the new method must eventually entirely supersede the old, which is condemned alike by publishers, authors, librarians and general readers.

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A Novel Invention.—We have been privileged to witness a demonstration of the "Amplex" patented method of binding, and when the process had been fully described our first impulse was to exclaim "How simple, why was it never thought of before?" Strictly speaking the casing of books (that is the form of covering adopted by publishers in the original issue of their books) is but a decadence of bookbinding. The boards are all cut to gauge by the thousands, and the covers made and lettered complete ready to receive the books. These are sewn in the ordinary way, but as the cords or tapes cannot be laced into the boards of the ready-made covers, a strip of mulle muslin is pasted down the back of each book, which is then pasted into its cover, the muslin joints being hidden by the end-papers. This is a superficial imitation of bookbinding, and may be likened in its inefficiency to the hanging of oak doors on tin hinges.

The "Amplex" process provides veritable end-papers, so strong and so cleverly adjusted that when the book and its cover are joined together, they actually become one, and inseparable by any fair means.

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The "Amplex" patent stands out unassailable, the only perfected process of *casing* books so that they shall to all intents and purposes be equal to *bound* books, at a cost but little in excess of that of the old and imperfect method.

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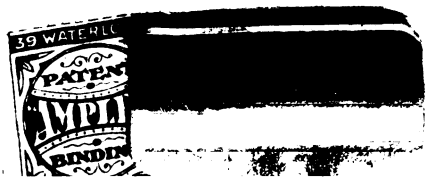

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